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Hints and Helps for the Plant Superintendent
(*In Every Issue*)

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VOL. XXII—No. 20
Sept. 27, 1919

Rock Products seeks and reports everything of interest to producers of crushed stone, sand, gravel, lime, cement, gypsum products, agricultural limestone, phosphate, potash and glass sand. It spends many times more money than any other journal of the industry to compile its message every two weeks. Appreciate Rock Products.

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Vol. XXII, No. 20 September 27, 1919

Printing of this issue, 4,000 copies

Second class entry at U. S. Post Office.

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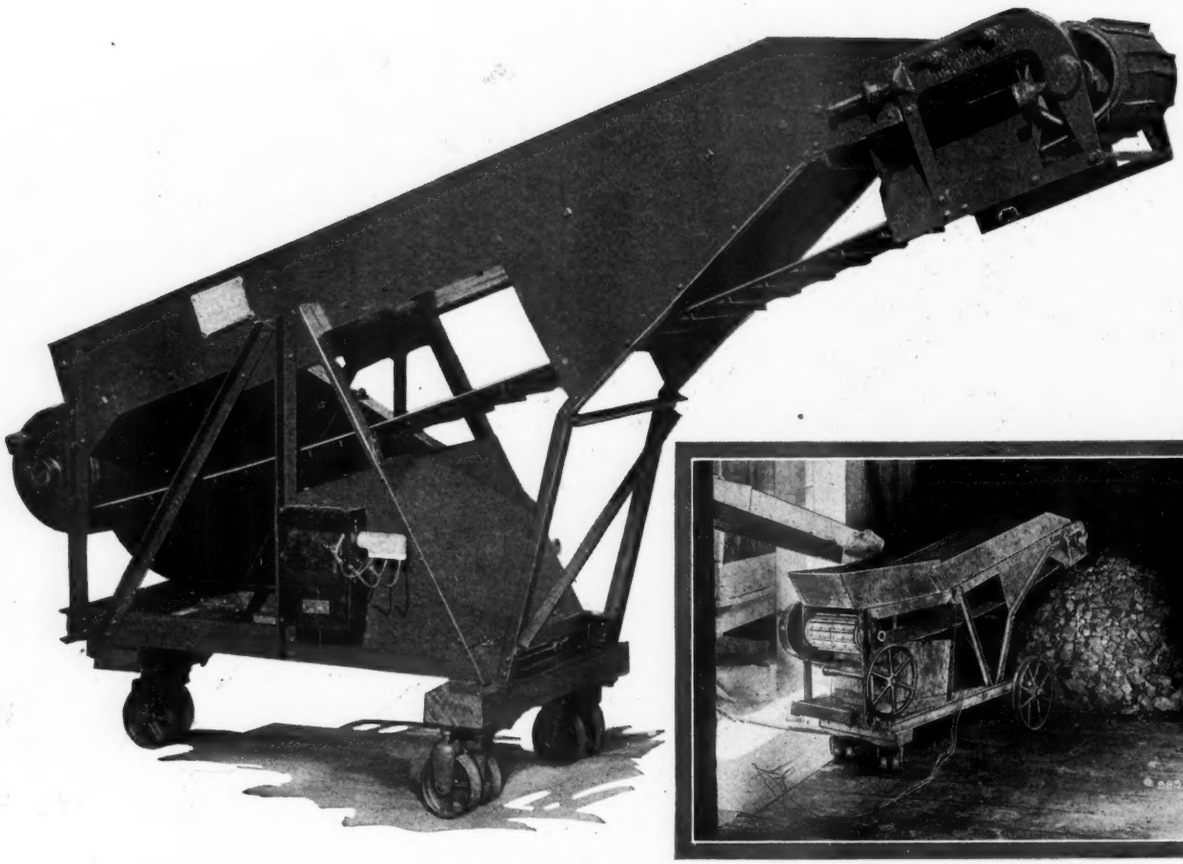
PUBLISHED EVERY OTHER SATURDAY by the Tradepress Publishing Corporation, 542 South Dearborn St., Chicago, Ill., U. S. A. W. D. Callender, president; T. J. Sullivan, vice-president; George P. Miller, Treas.; C. H. Fuller, Secy.

SUBSCRIPTION

$2 a year in United States; $3 a year, Canada and foreign. Single copies, 20 cents. Date on wrappers indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

Entered as second class matter July 2, 1907, at the Postoffice at Chicago; under act of March 3, 1879.



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The lower cut shows a chute which is an extension of a shaking screen leading into the door of the box car and delivering, with a minimum of breakage, to the Pratt Box Car Loader. This loader is a light, motor operated belt conveyor, the belt being protected by metal cleats and of sufficient length to load the lime well back into the car. The loader is light enough to be readily moved around by one man.

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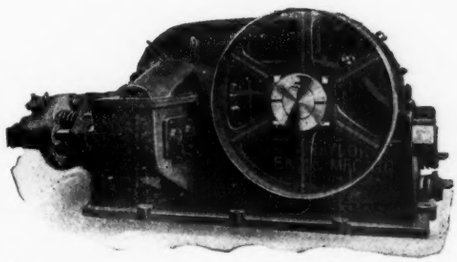

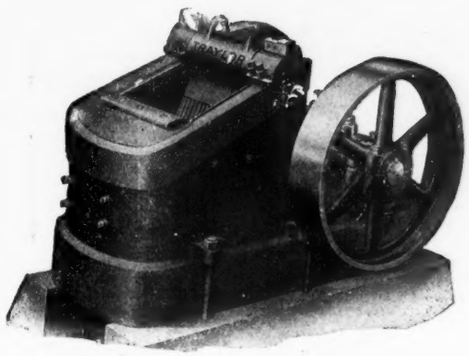

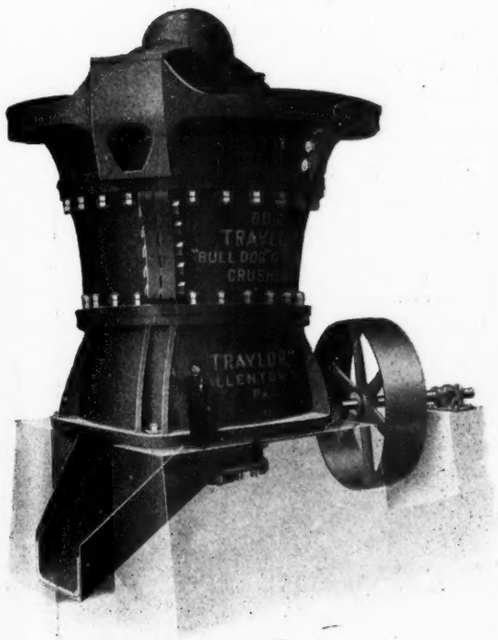

Like the boys coming back from overseas, we're mighty glad the war is over. While it lasted, we did our bit, and quite a little more in turning out the various materials our Government demanded of us at a speed and precision that would have seemed impossible before we started. And now it's over — the nerve-racking strain of keeping production of war materials at its maximum, and still upholding, in the highest degree possible, the Traylor Standard of Service to Customers.

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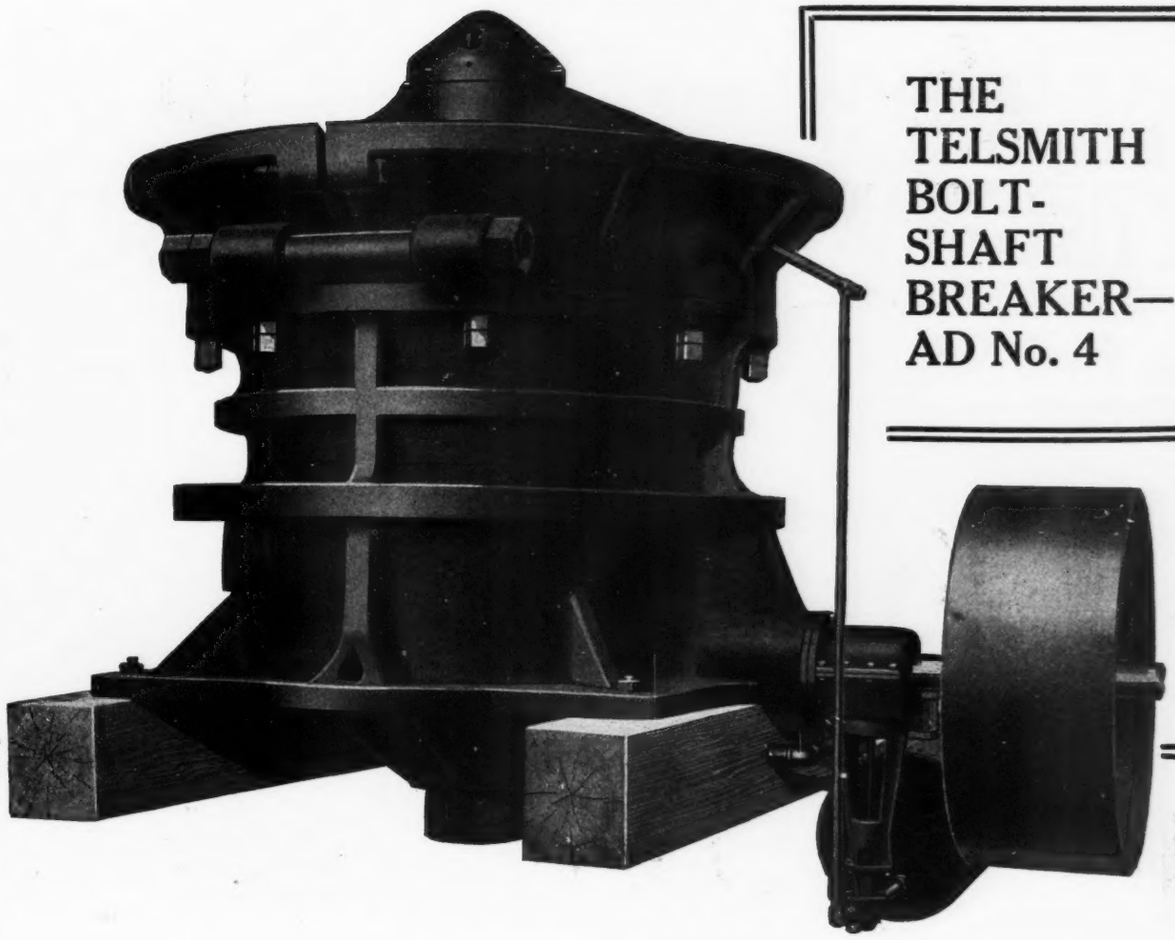

THE TELSMITH BOLT-SHAFT BREAKER—AD No. 4

Back in 1909, when the pillar-shaft crusher was only about two years old, serious doubts were entertained as to the life of babbitt bearings when subjected to direct crushing pressures; but the last ten years have demonstrated that babbitt will wear remarkably well under direct crushing pressures, provided the eccentric area is ample and properly lubricated. And why not? Obviously there are two ways of reducing the pressure on a bearing — either by leverage (as in the lever-shaft breaker), or by increasing the bearing area, as in the pillar shaft type. The customary lever ratio in breakers of the suspended shaft type is 2½ to 1. In the Telsmith Breaker, leverage has been eliminated; but the eccentric area is *trebled*, so the working pressure is actually lower than in the ordinary lever-shaft breaker. This fact is reflected in the long life of the Telsmith eccentric sleeves, as demonstrated at a great many plants, for instance: Charles Warner Co., Wilmington, Del.; Thomasville Stone & Lime Co., Thomasville, Pa.; Story Rock Co., Bozeman, Mont.; A. H. Wilcox Co., Chicago, Ill.; Federal Lead Co., Flat River, Mo.; Liberty Bell Gold Mining Co., Telluride, Colo.; Penn Iron Mining Co., Vulcan, Mich.; Barnes-King Development Co., Marysville, Mont.; Phelps-Dodge Corp. (Burro Mt. Branch) Tyrone, N. Mex.; Webster Stone Co., Irvington, Ky.

Two other features contribute to the life of the Telsmith eccentric bearings and its low power consumption: (1) the bearings are dust-proof, due to their location inside the head, instead of below the crushing chamber; (2) Lubrication is by *oil under pressure.*

Both of these features contribute materially towards cool, clean bearings and long wearing babbitt. If you are interested in gyratory crusher design, let us send you our catalog No. 166 describing the Telsmith Primary Breaker and our Bulletin No. 2-F-11 covering the Telsmith Reduction Crusher.

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AT midnight the engineer of the Brooten (Minn.) electric light plant shuts down his day engine, starts his night power unit, and goes home to bed.

This night unit—a Worthington Type "W" 10 h.p. oil engine—then runs without attendance until the day engineer arrives at six o'clock.

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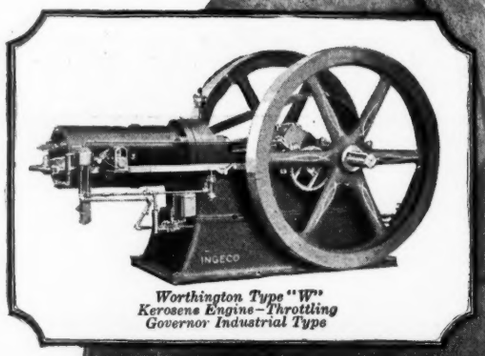

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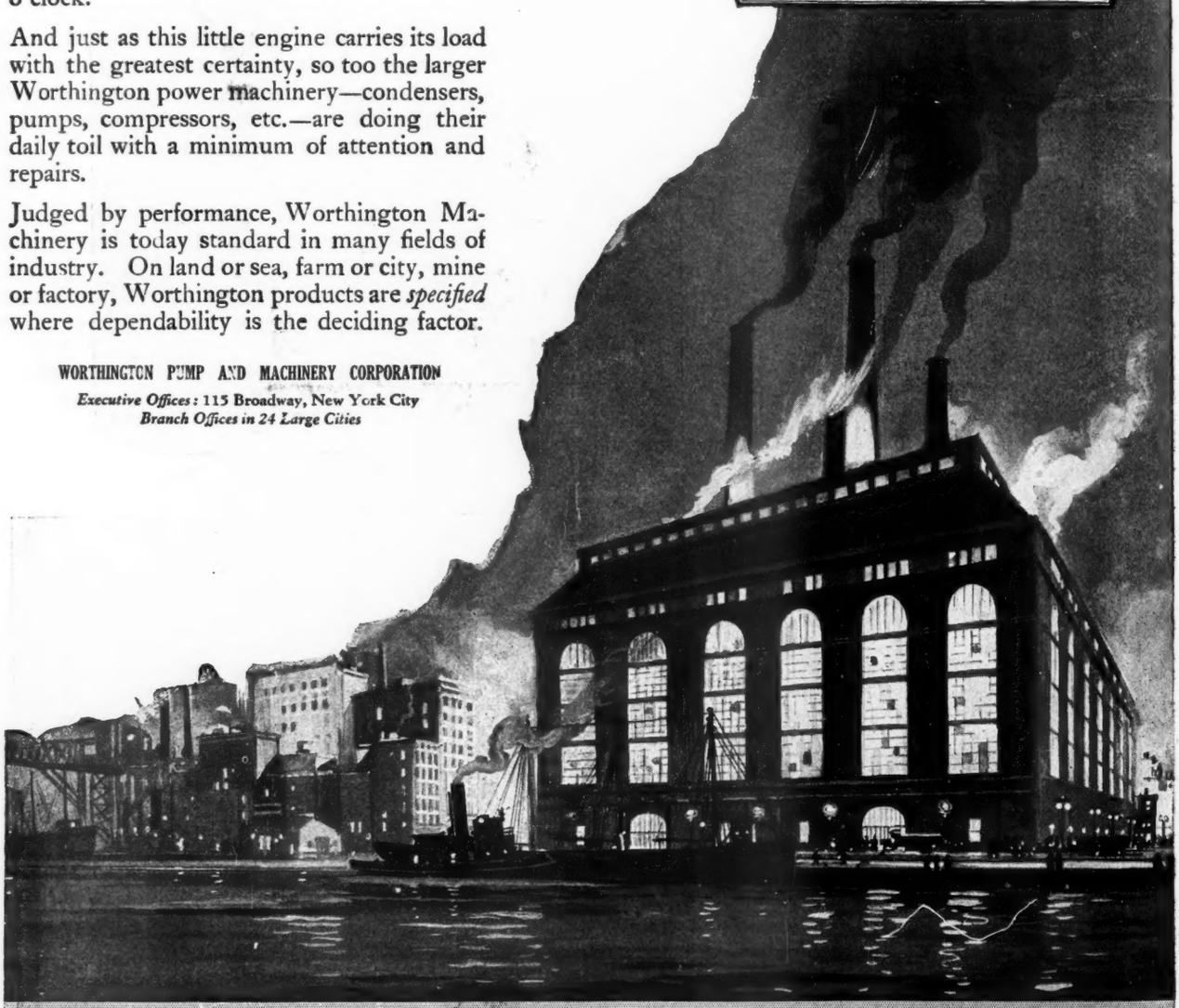

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Rock Products

Vol. XXII Chicago, September 27, 1919 No. 20

Plant Design—and Subsequent Operation

Eliminating the Shortcomings of a Poorly Designed Plant Just as Essential to Successful Operation as Efficient Management

PLANT DESIGN in a broad sense includes not only the shape and size of the buildings and arrangement of machinery, but a consistent *plan of operations*. There are obviously an infinite number of ways of stripping and opening a pit or quarry, of laying out the plant with respect to the quarry workings, of transporting the material to the plant proper, as well as handling and treating the material afterward. But there is *one best way* for each operation, and there are numerous inefficient ways.

The history of many a plant is the investment of hard-earned capital and the subsequent re-investment for several years running of any and all hard-earned profits for "changes and improvements." Can these changes and improvements be avoided?

They certainly can to a very large extent by use of foresight and of expert advice. A great many operators think they can buy the plans of plant as they would the plans of a "Ladies' Home Journal" bungalow. And other operators are reluctant to admit that any one else can tell them anything about their business.

Practically every other industry has outgrown this point of view. Operators of steel mills and blast furnaces long ago came to recognize that the construction of mills and furnaces was just as much a specialty as their operation; or, in other words, that the operation of a plant did not necessarily qualify them to design one.

If this is true of such industries as have become more or less systematized and standardized, how much more so must it be true of industries for producing raw materials where no two operations can ever be exactly the same? Yet the lime plant or quarry or gravel pit operator who spends a dollar for outside advice is much more the exception than the rule.

They say some men hold a nickel so close to their eyes that they let $1000 slip by. The same might be said of many operators—that their eyes are so focused on little details of their own plant that they fail to see glaring gaps which an expert could readily point out to them after a few minutes' observation.

A period of rising prices is invariably followed by an energetic attempt on the part of progressive producers in all lines to reduce costs by more efficient methods. We have just witnessed the speediest rise in prices on record and we are beginning to see on all sides a racking of brains to keep costs down.

An evidence of it is the activity of portland cement producers in studying and installing plants for waste heat utilization. For years these manufacturers were content to waste two-thirds of the energy of the coal they burned in their kilns. They knew they were wasting it, but what of it; every one was doing the same.

But let one or two progressive producers get somewhere near "value received" for the coal they burn, and the others must of necessity follow suit or stay out of the running.

Big economies in fuel consumption in lime plants are likewise possible and are being studied and developed by progressive lime producers.

But the biggest field for economy in all rock products plants is probably in re-designing operations to eliminate unproductive hand labor. This does not necessarily mean the introduction of new machinery, but sometimes only a rearrangement of units.

An ordinary laborer at $4 a day for 200 days means an expenditure of $800 a year. And $800 a year is the interest on an investment of $8,000 at 10 per cent, so it is easily seen that to eliminate the labor of a half dozen men justifies a pretty considerable expenditure of capital. And it simplifies the labor problem.

The fall and winter season now approaching is a good time for the operator to look at his plant through the big end of his telescope instead of through the little end, where he can only see a part of the plant at a time.

It is a serious handicap to have a poorly designed plant, but it is a worse handicap to keep it an inefficient layout while your competitors are improving theirs. The man who pays good money to have his plant properly designed in the first place, uses foresight, while the one who changes and improves uses only hindsight. But hindsight is better than being altogether blind.

A Quarry at Last Comes to Its Own

Remarkable Deposit of Red Quartzite in Minnesota, the Usefulness and Value of Which Remained a Long Time Undiscovered

ONE SELDOM LOOKS for romance in a quarry story, but the history of the Jasper, Minn., quartzite quarries is not without a tinge of it. The prosperity of these quarries at present is one of probably many thousands of instances where German greed to control the world's industries curiously resulted in a boomerang—freeing most of the world from all dependence on existing German industries and leading to discoveries and inventions which make the former German industrial monopolies look like thirty cents.

Wanted—A Grinding Stone

Previous to the beginning of the war in 1914, America was importing from Germany a certain stone known as "silex" and from the shores of Denmark the "Danish pebble." Large shipments were brought to the United States, amounting during the year previous to the beginning of the war approximately $14,000,000. The German silex was then the highest grade of stone known for lining tube mills and other surfaces subject to intensive abrasion. It was considered the toughest and hardest, being used extensively in the grinding of ores and the production of metals. It was said to have a crushing strength of about 40,000 lbs. to the square inch.

Following the outbreak of the war, the importation of this stone to the United States was, of course, stopped. The metal mining and metallurgical industry which was using the German stone extensively in the grinding of ore was threatened with an immediate shortage of Danish pebbles and German silex blocks. It was thus that the users of the German stone in the United States were forced to find a substitute. The stone quarries throughout the country were searched in the endeavor to find a stone which would replace the German import.

Some varieties of hard and some of tough stone were found in the different parts of the United States but none of them seemed to solve the difficulty. Some stone in Tennessee and some in Florida, while possessing hardness, were found to be too brittle and were therefore unsatisfactory in the mining industry. The ore mills found them poor substitutes for the silex.

Purchased as Crushed Stone Proposition

In southwestern Minnesota was a quarry which had the reputation of breaking every operator who tried to work it. The rock was so hard and tough it broke and wore out equipment faster than the average operator could find funds to replace it.

Eventually the quarry was acquired by C. F. Lytle, of Sioux City, Iowa, who, among other activities, was a municipal paving contractor of wide experience in the Central West. His original intention

General view of the quarry of the Jasper Stone Co., at Jasper, Minn.

Cutting paving blocks at Jasper quarry

in acquiring the property was to obtain a stone for paving blocks and concrete aggregate harder and more durable than the ordinary run of material in that section.

Mr. Lytle had the usual experience of previous operators in finding machinery to crush and cut the rock. The story goes that he took some samples to a Chicago machinery man to demonstrate the difficulties in crushing it. This was at the time American manufacturers and users of grinding machinery were keenest in their search for a substitute for German silex. The machinery man suggested that the material looked like a good substitute for silex. Then followed tests and promotional work which has led to an international reputation for the products of the Jasper quarries.

The first order for the material for tube-mill lining came through a former employee of the Jasper quarry, who had subsequently gone into mining work in the Far West. When his company faced the problem of replacing silex tube-mill linings he remembered his experience with the Jasper stone, and how it had "busted" his employer; and through his inquiry the mine plant owners were put in touch with the present operator of the quarry.

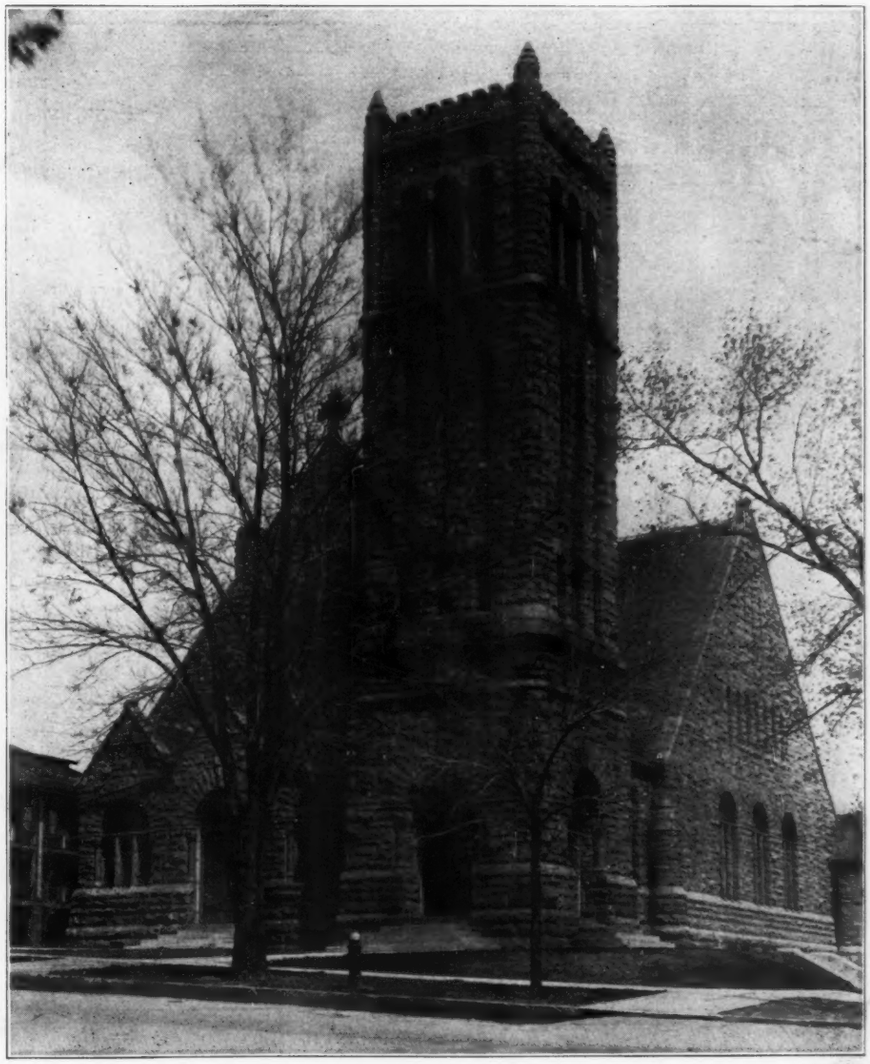
Remarkably High Crushing Resistance

The rock in the Jasper quarry was found to resist a crushing strength of over 45,000 lbs. to the square inch, while the Dell Rapids, S. D., stone had a crushing strength of only 10,000 lbs.; that of Sioux Falls, S. D., about 14,000 lbs., and the New Ulm, Minn., product approximately 15,000 lbs. Good, hard limestone has a crushing strength of only 8,000 to 12,000 lbs. a square inch. The German silex crushing strength of about 40,000 lbs. was the only one comparable with the Jasper stone.

The owner of the quarry believed that the hardness and the toughness of the stone which had caused the financial ruin of former operators of the quarry was sufficient recommendation for its adoption in the grinding of ore and in the building of pavements. He believed that if the proper kind of a crusher could be obtained that the hardness of the stone would become an asset instead of a liability.

At a great expense a large crusher lined with manganese steel was secured and at the same time a few hundred tons of the stone known as "Adamant Silica" or "Jasper stone" were quarried and were shipped to the mining districts of the United States for trial.

The trial proved that the Jasper product was about as good as German silex. The best posted authorities on grinding of ore immediately pronounced it the best stone on the market, and the trial orders were followed by individual orders of 5,000 to 15,000 tons.



Example of the use of Jasper stone in building construction

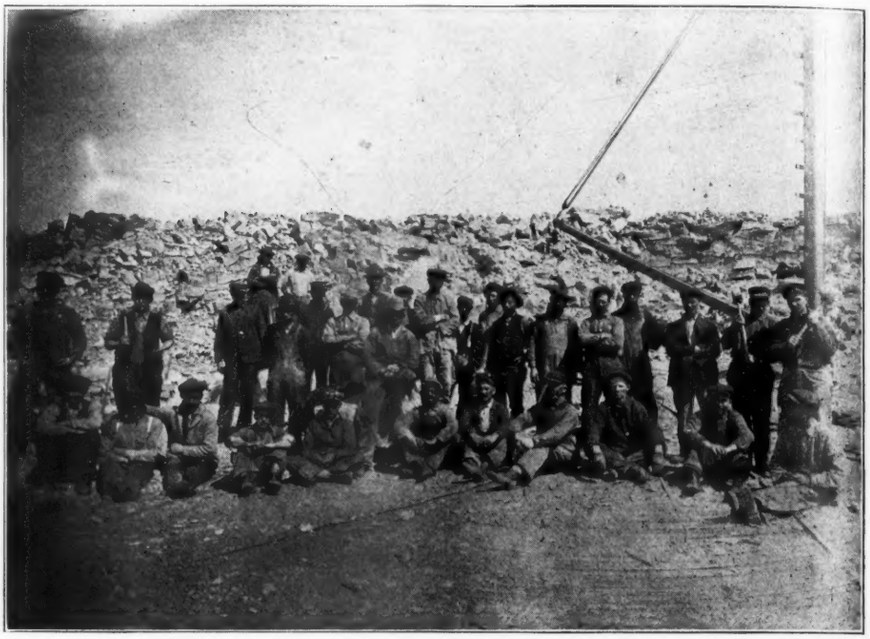
The stone was adopted at once by the producers of gold, silver, copper, zinc, enamel, lead and explosive powder. Cement plants in one-fourth of the States in the United States use Adamant silica in the grinding of cement. The stone is used in all of the mining States of the West and in Alaska, and inquiries regarding it have been received from Japan, Canada, France, Mexico, Central America and South America.

During the period of the war, Adamant silica was used at the United States Government powder mill at Old Hickory, Tenn. This powder mill is the largest powder mill in the United States, having produced a million pounds of powder a day during the war. The use of the Jasper stone for this purpose as well as in the mining of copper justified the A-6 priority rating given the stone by the War Industries Board during the period of the war.

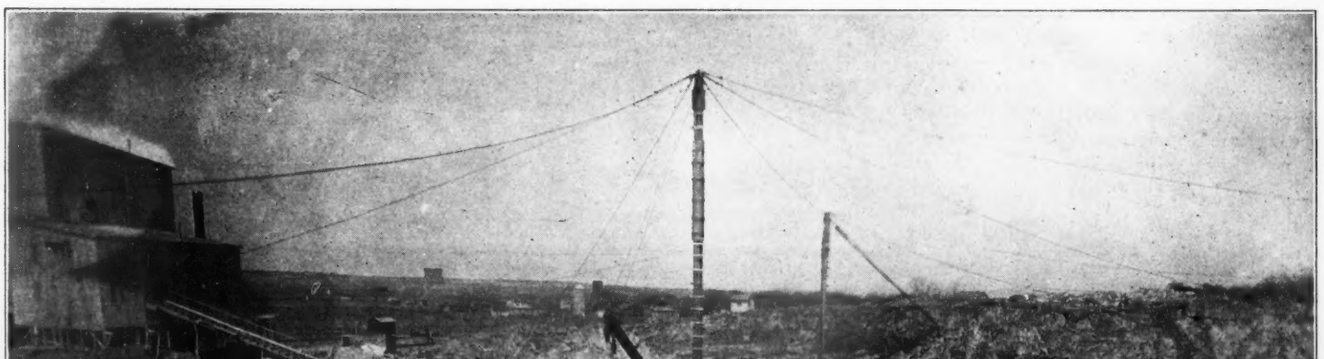
Silica Content 94 Per Cent

The stone has a reddish tint and resembles the red pebbles sometimes found in stream gravels. Ground into sand the stone becomes as white as ordinary silica glass sand. It is composed of 94 per cent silica, with the rest alumina, iron and secondary minerals. It is something the same texture and appearance of the famous red sandstone found at Pipestone, Minn.—which is not far away—out of which the Indians used to carve pipes of peace and other kinds. It looks like pipestone which has been fused or cemented under enormous pressure. There are 160 acres of this material at Jasper, extending to an unknown depth.

The Lytle quarry covers about two acres of ground, which are being actively



Employees of the Jasper Stone Co. quarry, including many experienced block cutters who have grown up in the industry



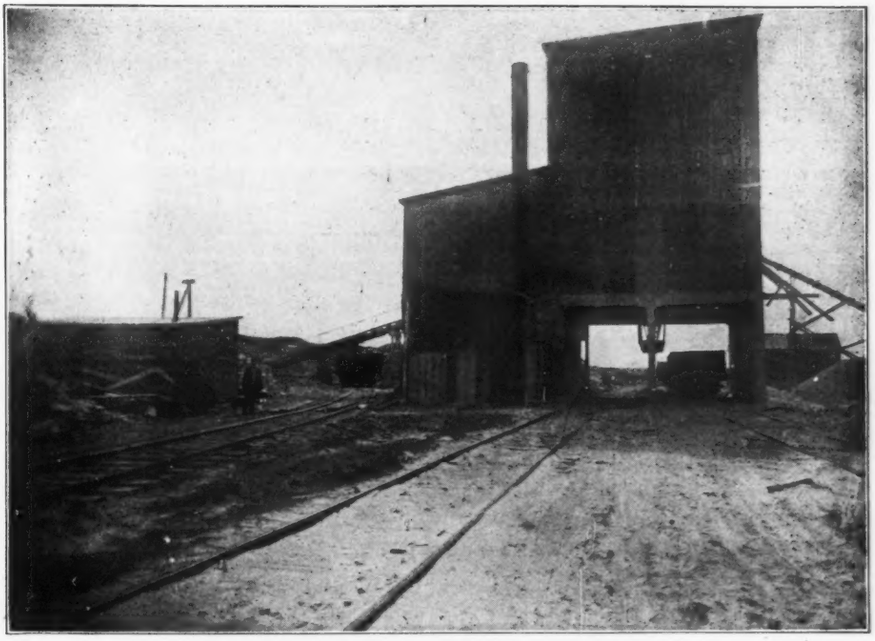
View of quarry and crushing plant, showing manner in which the stone is broken up

operated because of the superior quality of the stone at this particular spot. The stone found a short distance from this spot is of a softer composition and an inferior quality. Drillings have been made at the present time to a depth of about 150 ft. and there has been no variation in the quality of the stone to this extent.

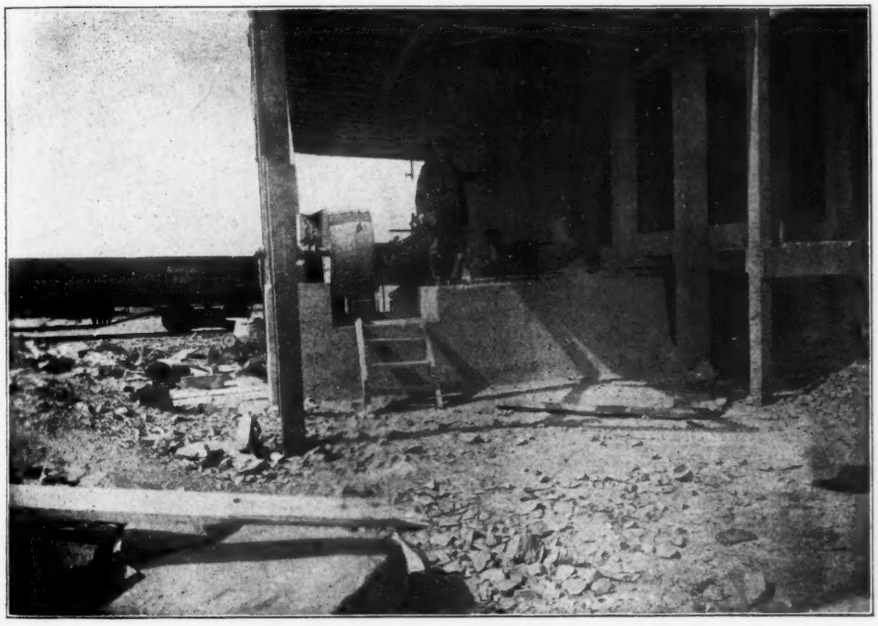
The site upon which the quarry is located is one of the most beautiful places in the country, the high walls of stone appearing as an impassable barrier.

The drills used in the operation of the quarry are driven entirely by air, the compressed-air mains being run around the outer walls of the quarry. Drills from 6 to 20 ft. in length are used in preparing the blast holes for the dynamite. The drills are operated and the blasting performed by experts who are able to estimate exactly the amount of stone which will be removed and the distance to which it will be pushed by the blast.

After the block of stone is removed by the blast, it is lifted to another section of the quarry by a huge derrick. The block usually weighs several tons. In this section of the quarry, the stone is cut into smaller pieces by means of pneumatic hand-drills. It is then conveyed by cars to a part of the quarry where it is made into the finished product. If the stone is to be made into blocks, it is taken to the cutting machines where by great pressure it is cut into blocks of different sizes. Each man operating at the cutting machine is an expert and is able to cut the blocks into the desired size by means of two different sized openings in the mouth of the cutting machine.



Crushing and loading plant of Jasper Stone Co.



No. 8 gyratory crusher with 4-in. manganese-steel lining

The cutting machine used in the quarry of the Jasper Stone Co., the producers of the Jasper stone, was especially designed and invented for use in this quarry. It is capable of exerting immense pressure, the casting for the part of the machine which is forced upon the stone weighing seven tons.

Rock which is to be used for crushed stone is taken in quarry cars to the top of a building containing the crushers. The large stones are dumped into a No. 8 gyratory crusher by use of a derrick. The crusher is lined with a 4-in. manganese steel, the stone being of such a high degree of hardness that this lining lasts only six weeks.

Gravity chutes carry the crushed stone to the bottom of the building where it is emptied into conveyors, which again convey the stone to the top of the building. Here the stone is emptied into a screen having four sizes of perforations, from small to large. The crusher rejections flow through a chute to a smaller crusher, a No. 6 gyratory.

This crushed stone is used chiefly for road building and paving, although some of it is used for grinding pebbles for ore and cement. The coarse dust is used in cleaning lithographic plates, while the fine dust makes a polish for silverware and other articles. There is no waste in the entire process of quarrying the stone.

In the manufacture of the cut blocks many expert stone cutters are employed, who do the cutting not by machine, but by hand. Much of the work which is turned out by the "hand-cutters," as they are called, is finely chiseled and accurately shaped.

Other uses for screenings and sand are concrete floor surfacing, special mortar aggregate, concrete pavement surfacing and the protection of other concrete surfaces subjected to exceptional wear or abrasion.

Thus, thanks to German "frightfulness" and American ingenuity, has one of the most profitable quarry industries of this country been developed.

Appeal Against Railroad Embargo on Gravel

LANSING, Mich.—The State Office Building Board has appealed to the Public Utilities Commission to compel the Pere Marquette Railroad to lift the embargo on shipments of washed gravel for use in the new State office building.

Design of Large Rock-Crushing Plants

Part III—Problems of Plant Design and Location—Use of Flow Sheets

By Brownell McGrew

TWO PREVIOUS ARTICLES have discussed crushers, elevators and conveyors. The following considers some of the more general problems of plant design, including a theoretical analysis of its operation.

Plant Design

The problem of arranging and balancing the various units is closely interrelated with that of choosing the individual machines; and is one requiring good judgment and a thorough study of conditions. The plant as a whole may well be regarded as a machine, dependent upon the efficient performance of its parts, and their proper disposition, for its successful operation.

Crushing engineering can never attain the drab dignity of an "exact science." In no two installations are the conditions to be met, the same. Aside from its efficiency as a mechanical entity, the success of a plant hinges upon the foresight and judgment of the designer in studying outside conditions, and putting in a plant that will meet them. In the crushing game there are few cut-and-dried rules to aid the engineer. Such formulated rules as there are, are generally empirical in character, and are the result of years of compiled data and experience.

Thus it is not surprising that plants, upon which considerable thought and care have been expended, oftimes exhibit a tendency toward "acute indigestion" when the attempt is made to pass stone through them. Nevertheless, it is a fact that the greater percentage of blunders can be eliminated if the engineer will keep an open mind in the selection and arrangement of his machinery.

The study of outside conditions bearing upon the installation is highly essential. The quarry layout, the stone to be crushed, market conditions, getting the stone to the plant, getting it away from the plant, transportation equipment, power facilities—these are among the factors that bear directly on the plant design. It is not the purpose of this article, however, to go into detail regarding these outside influences, except as they may be mentioned in connection with the layout of the plant itself. It will be assumed that they are all known factors.

Plant Location

The location of the plant with reference to the quarry is generally one of the knottiest problems which the engineer has to solve. Upon its solution will depend, in many cases, the type of plant to be erected. Blest is the operator whose quarry floor lies above the level of the point at which the stone is to be delivered to the common carrier. It costs money to elevate stone; and this fact should be kept in mind, not only in locating the plant, but in the design of the same.

Generally speaking it is cheaper to elevate in the plant itself than it is to elevate the stone to the plant. The truth of this statement is reflected in the tendency of stone men to do away with the incline on modern large-capacity plants; and to so place the initial breaking units that the quarry cars may be run in over

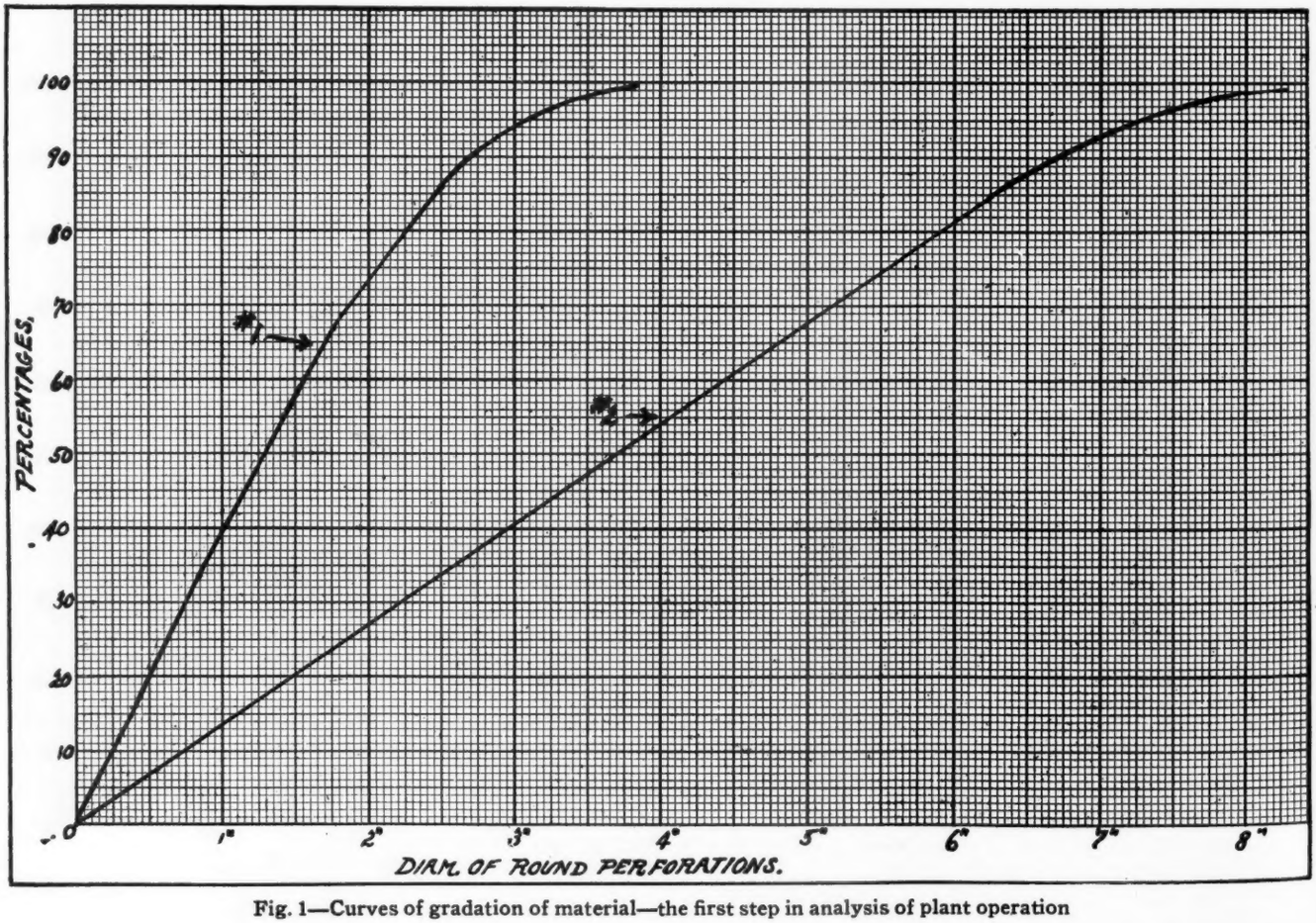


Fig. 1—Curves of gradation of material—the first step in analysis of plant operation

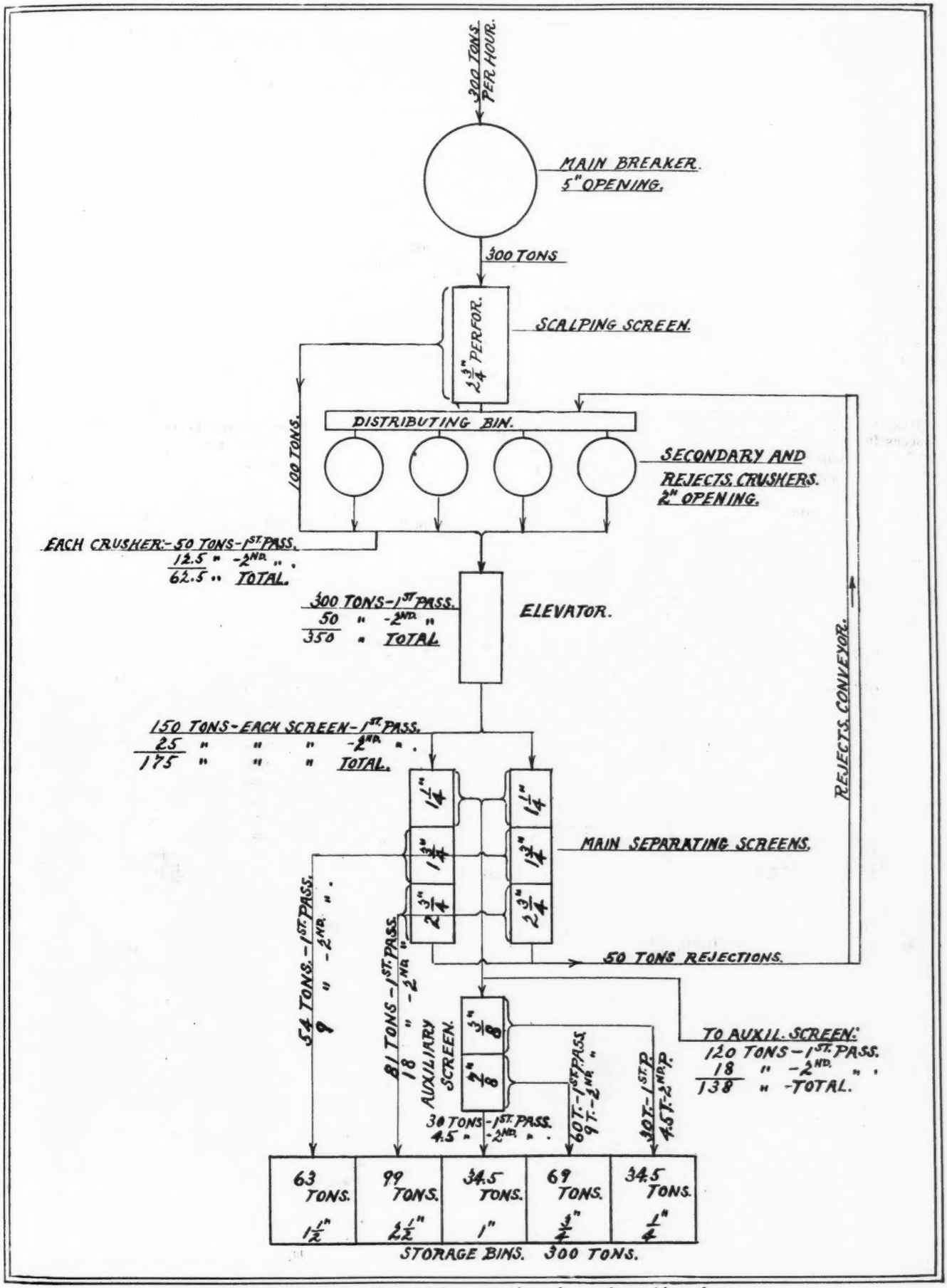


Fig. 2—Flow sheet for studying operation of a rock-crushing plant

the receiving hopper under the same motive power that propels them in the quarry. The merit of this practice hinges not only on the increased efficiency of elevation, but also on the fact that trains can be handled through the crusher house at greater speed, and the desired capacity attained with less rolling stock.

The location of the plant will, of course, be influenced to a great extent by the factors of track room and proper grades for handling the railroad cars to and from the storage bins; or by the problem of steamer and barge loading, as the case may be.

In some instances the position of proposed future workings may dictate the point upon which the mill is to be set even though the location might not be the best with reference to the present quarry. A rather unique provision to meet future conditions, was made in one of the large iron mines in this country, where the entire initial breaking plant is mounted on wheels on an inclined track, so that it may be lowered when the mine is opened up on a lower level.

Gradation, and the Flow Sheet

A first essential of crushing plant design is a study of the mechanical analysis of crushed stone. A gyratory set to a given opening will deliver approximately 85 per cent of its product of a size that will pass a perforation whose diameter is to the crusher opening as 1¼:1. For the rolls and jaw the percentage will probably be nearer 80. While these figures are not exact, they are close enough for purposes of plant analysis.

The gradation curve of the crushed product is very nearly a straight line, under the 80 or 85 per cent point, and above the 5 or 10 per cent point. The upper part of the line is rather indeterminate, as the tendency of some stone to slab is greater than that of others. The lower part of the line varies somewhat according to the type of crusher used, and the amount of fine material coming in from the quarry. However, as the whole process of estimation is approximate, the straight line, drawn from the zero point through the predetermined 80 or 85 per cent point will serve.

The accompanying Fig. 1 will illustrate the method of drawing gradation curves. Curve No. 1 is the graphic representation of an actual seive test made on the product of a No. 6 gyratory crusher, set at 2-in. opening, and crushing hand-loaded stone. Curve No. 2 shows what may be expected from a crusher of the same type, set at 5-in. opening. Tests made by the writer on stone which had been passed through a No. 12 gyratory, set at 5-in. opening, scalped of the product under 2½-in. ring, the rejection passed through a No. 6 gyratory, set at 2-in., and the scalped material combined with the re-crushed stone, show that the analysis of the resultant product will not vary greatly from that represented by curve No. 1, where the stone was reduced in one operation from run-of-quarry. Hence it will be seen that the straight line holds good whether the reduction has been done in one machine or in more than one. These tests agree with theoretical analysis.

Fig. 2 shows a flow sheet, made of an imaginary plant, from the gradation lines of Fig. 1. The figures are based on an estimated capacity of 300 tons per hour, and the sheet is drawn for one hour operation. It will be noted that the figures take care of two passes of the stone through all machines following the scalping screen. This is accounted for by the fact that some 15 per cent of the stone returns for re-crushing. As a matter of fact, a small portion of the stone will make a third or fourth pass through the finishing plant. Cognizance of this was taken in estimating the tonnage which the elevator, screens, and conveyor would have to handle, but it was ignored in the distribution, as the amount was too small to affect the grading much. When the amount to be re-crushed is large it is best to analyze the process through at least three passes.

The value of a carefully constructed flow sheet is manifest. It will aid in the selection of the various machines; it is a ready reference from which to deduce required capacities—and hence the size and number of machines to be installed. It furnishes a basis upon which to estimate the areas of screen sections required; and from it the efficiency of a tentative layout can be estimated. Not least among its virtues is the aid it will give in figuring the effect of adding a certain type of machine to the plant, or of altering the size and opening of secondary and rejections crushers.

[The next article will discuss the design and arrangement of the primary breaking plant and scalping screens.—Editor.]

Cement Company's Experience in Agricultural Limestone

THE PACIFIC PORTLAND CEMENT CO., CONS., with works at Cement, Calif., gives the following experience in the marketing of ground limestone:

"When we first offered a ground limestone product we did direct solicitation in the field among the farmers, but this was shortly proven impracticable as it did not produce results commensurate with the expense attached, and was thereafter discontinued. We have since marketed by mail in part, by our established dealers in cement and plaster products in part, and by fertilizer representatives selling on commission in part. Our commission to dealers and agents is 50c per ton.

"The principal obstacle to increasing our tonnage is the firmly rooted belief on the part of the farmer that he should purchase ground limestone at a price below the cost of manufacture, and the attempts of the farmers' associations and others to put in lime crushing plants of their own. This usually results in a very coarsely ground inferior product offered on the market at prices below those we can afford to charge. The final result is that the average rancher who needs ground limestone will not buy our product because it is higher priced than inferior grades, and he further will not purchase inferior grades after a trial, the result being that the sale of ground limestone in this territory is nearly at a standstill."

Kentucky Oil Shale Quarries to be Exploited

PROF. C. S. CROUSE, of the University of Kentucky, is credited as follows as regards the development of oil shale deposits in that State:

"The Kentucky shales are black Devonian shales and are widely distributed throughout the State, though as yet we have made tests on samples from but one field. In this field the shales occur in beds from 80 to 100 ft. thick, and though they have not been carefully sampled, samples taken at random and retorted in the laboratory show an average yield of about 25 gal. of crude oil to the ton. With better methods of retorting this field could probably be increased somewhat. As indicated from analysis and the samples treated the yield of ammonium sulphate will likely be fairly high.

"I have seen but one sample of the western shales, a few pieces from Utah, but the color is much lighter than that of the Kentucky shales and I have been informed that the western shales are apt to coke on treatment which none of the samples of our shales that I have tested show the least tendency to do nor have I heard of any other tests that have shown coking.

"As far as the commercial end of it is concerned I know of at least one company that has organized and has a good tract to operate on while I have heard rumors of one or more which are in the formative state as yet. This one company, I believe, plans to erect a 1,000 or 1,500-ton plant eventually and some part, if not all of it, in the near future. They have a site for their retorts and refinery on the Kentucky river which gives them a perpetual and unlimited water supply and their shale can be quarried by steam shovel, there being only slight overburden present where there is any at all. This latter fact is true also of a great many of the Kentucky deposits."

Big New Illinois Stone Producer

Monmouth Stone Co., with Quarries at Gladstone, Illinois, Going After State Highway Business

THE LIMESTONE QUARRIES at Gladstone, Ill., near Galesburg and Rock Island, are to be the scene of activity after a number of years of quiet. These quarries were once considerable producers of building stone, but their operation ceased about 25 years ago.

The new operator is the Monmouth Stone Co. (Inc.), "Quarriers," with offices in the National Bank Building, Monmouth. This company will construct a stone-crushing plant which eventually will have a capacity of 200 cars per day (10,000 tons). At present it is building a plant which will have an initial capacity of 2,500 tons per day.

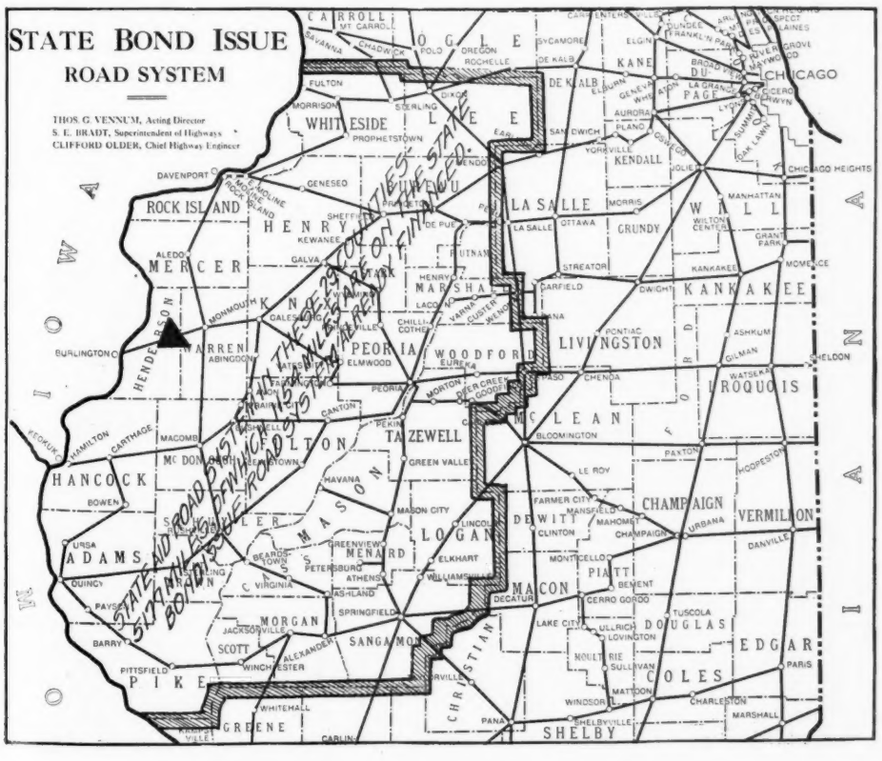
It is expected to have the plant in operation on April 1 of next year, when the new highway-building program of Illinois will be in full swing. The new plant is on the Chicago, Burlington & Quincy Railroad, and the accompanying map of a portion of Illinois shows the territory and the new system of State highways, which the proposed plant is expected to serve.

The company has engaged as consulting engineer H. E. Bilger, a member of the American Society of Civil Engineers, for a number of years connected with the Illinois State Highway Department.

Mr. Bilger is a native of Pennsylvania and a graduate of Bucknell University, and the University of Missouri. For a number of years he was in railway work, but from 1911 until recently he has been with the Illinois State Highway Department, except for less than a year, when he was a senior highway engineer with the United States Bureau of Public Roads. From 1915 until August 26 last he was road engineer of the Illinois State Highway Department, having general technical and administrative charge of the State's road construction, but not of the maintenance work.

Mr. Bilger, therefore, brings to the new company not only expert knowledge and experience of needs of the State in road materials, but a very intimate acquaintance with the specific requirements of the system of highways about to be constructed.

The Monmouth Stone Co. has been capitalized at $1,600,000 and the following officers have been elected: President, J. H. Jayne, Monmouth, Ill.; Vice President, R. L. Everett, Kirkwood, Ill.; Secretary, A. V. Peterson, Monmouth Ill.; Treasurer, J. W. Houston, Cashier State Bank of Kirkwood, Kirkwood, Ill.



Territory to be served by new limestone company

H. E. Bilger, Consulting Engineer, Monmouth Stone Co.

General Meeting of the Lime Association

INDICATIONS point to a large attendance at the coming general meeting of the Lime Association which is to be held on October 1, at the Washington Hotel, Washington, D. C.

Members who desire to investigate the operation of Mr. Whipple's soil tester and to apply to it any checks they may wish, will have an opportunity at the general meeting to test any samples of soil they may care to bring with them. A match box full of soil is ample for testing purposes.

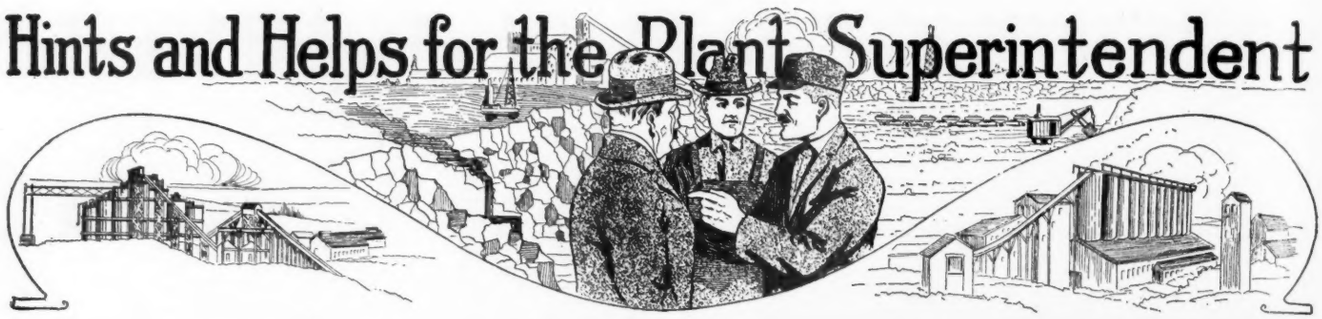
It has occurred to R. F. Hall, General Manager of the Lime Association, that some members may have in mind plots of ground of a known lime requirement and doubtless it would be interesting to them to see how Mr. Whipple's instrument agrees with other tests of this same ground. It is contemplated that some of these instruments will be completed for the examination of members at the general meeting.

The Belgian Cement Industry

The Belgian cement industry produces both portland and natural cement. Portland cement is made chiefly in the Provinces of Hainaut and Antwerp. Before the war some 50 plants gave employment to about 5,000 men. Approximately one-half of these establishments were owned by stock companies, having a combined capital of about $9,000,000.

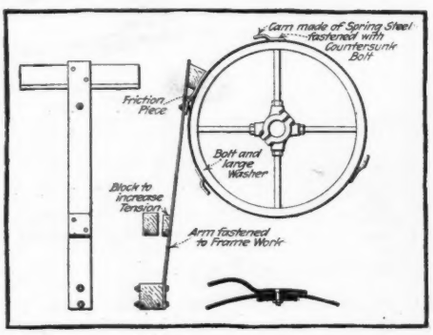
Only about one-third of the Belgian production is used in the country, the remainder being exported.

Hints and Helps for the Plant Superintendent



Cleaner for Rotary Screen

IN SCREENING a roll product, the apertures of the screen often become clogged, but may be freed by means of a spring arm attachment. This is made of a good piece of 1-in. by 4-in. lumber, about 6 ft. long, with a crosspiece of fairly hard wood 18 to 24 in. long. The arm is fastened at one end with bolts on one side of the framework. The cams



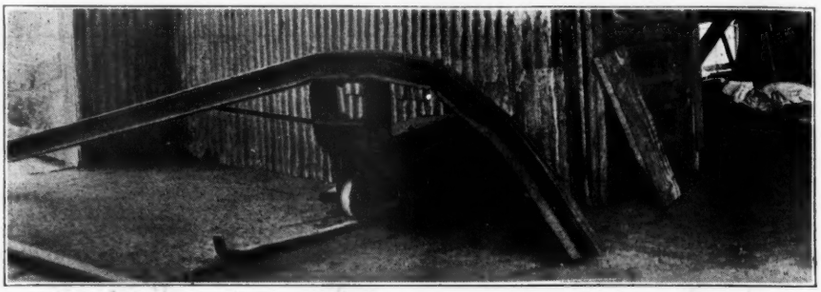
Rotary screen cleaning device

are made of discarded wagon spring, and measure not less than 2 in. wide by ⅜ in. thick. The friction piece on the arm is made of the same material, and the cams are fastened on the screen itself by countersunk bolts and large washers.—Charles Labbe, in the "Engineering and Mining Journal."

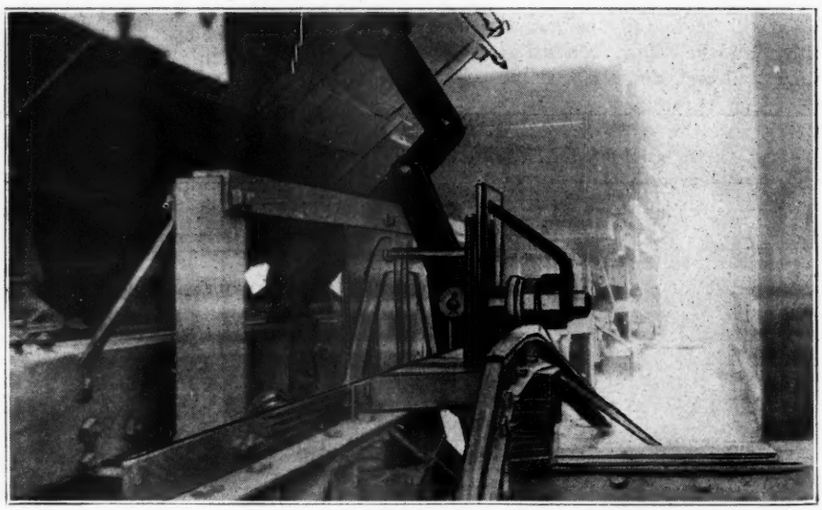
Automatic Car Dumper

THE THREE VIEWS on the right show the details of an automatic dumping device for side-dump quarry or sand and gravel cars. There are several of these installations in the Middle West, the particular one shown being that of the Blue Limestone Co., Minneapolis, Minn. This is a sand and gravel company of which John Wunder is president and general manager.

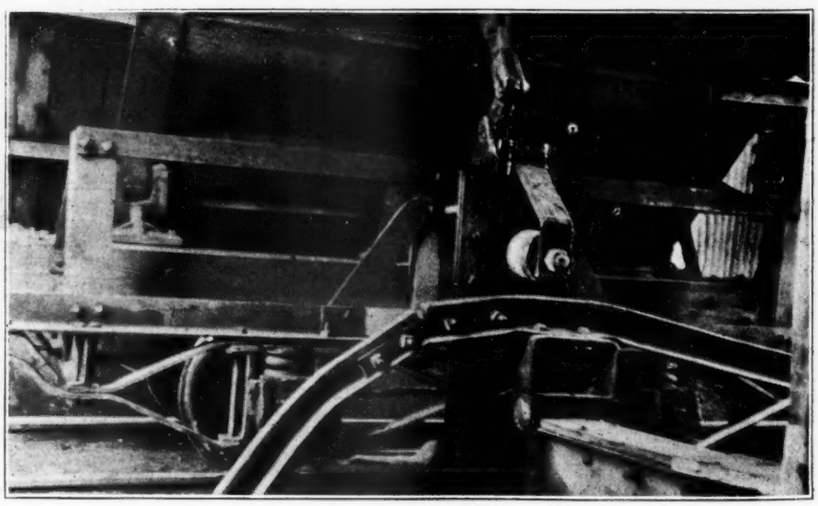
The working of the device is quite clear from the pictures. The principal feature of this installation is the movable rail, which can be swung out of the way when not in use—a considerable advantage over the fixed-rail device. After the car is dumped it has to be righted again by hand, but as it is well balanced this is easily and quickly done.



Trip rail, showing roller device for moving rail to one side



Lever mechanism on car at dumping instant



Car dumped—the body has to be righted by hand

Uses Locomotive Crane to Segregate Material in Pit

THE SUMMIT SAND & GRAVEL CO., Terre Haute, Ind., does its pit excavation with a 15-ton locomotive crane having a 38-ft. boom and a 1½-yd. clamshell bucket, which enables the operator to run along the bank and select either coarse or fine gravel; the material in the bank is not uniform. When there is a surplus of torpedo sand it is stored in a pile near the track by the use of a belt conveyor, and then in the spring, before it is warm enough to operate the pit, this stored material is sold.

It is rehandled from the pile to the car by the locomotive crane at an estimated cost of about 5 cents per cubic yard. This practice gives the men early employment and enables the company to have material on the market early.

This plant, which is of 15-car capacity per day, has found that these are very practical methods of operation.

Covered Conveyor Belts

IT IS a general practice in most plants using conveyor belts to disregard the effects of the elements upon the belts, leaving them unprotected to the sun and rain while in operation, and to the snow and ice of winter when standing idle.

The accompanying illustration shows the plant of the Covington Sand and Gravel Co., of Covington, Ind., which claims that the life of its conveyor belt has been increased 25 per cent, due to covering of boards and roofing paper provided at a slight additional cost.

Quarry Stripping Problem

THE VIEW BELOW shows a quarry-stripping problem a Pennsylvania lime producer has to contend with. The limestone strata are apparently on end, and the top surface at some time or other has been swept over by a glacier. The projections showing on top of the ledge are not loose stones, but the sharpened ends of the limestone strata.

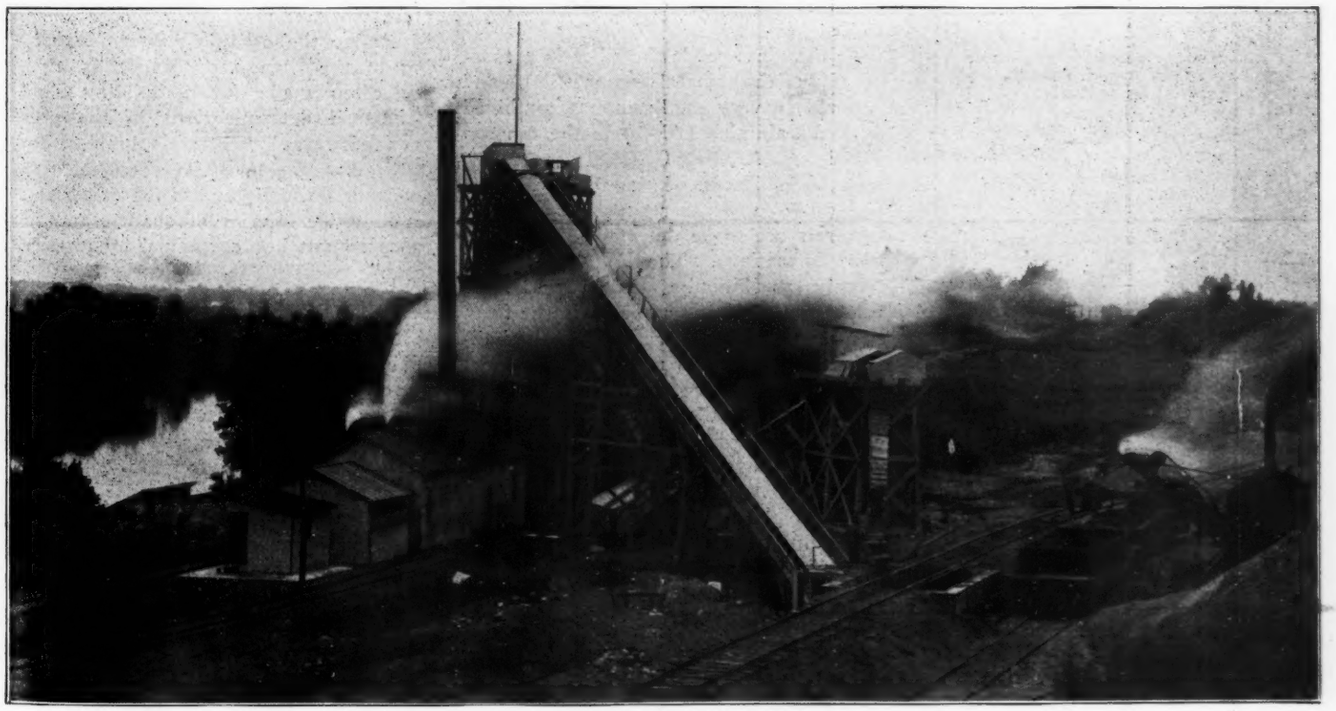
What is the most economical means of stripping a quarry like this? The producer in question takes off two or three feet of overburden, mostly by hand shoveling.

Evidently this would be an ideal proposition for hydraulic stripping; of course, the big problem then is one of drainage. With a pit quarry such as this the drainage problem would be difficult.

It is possible, however, that the construction of a drainage tunnel, like that described in ROCK PRODUCTS of August 16, page 26, would solve the problem of drainage.

If any quarry operator has knowledge of how a similar stripping problem was solved by hydraulic or other methods, the editor would like to hear from him. Don't hide your light under a bushel. It isn't the American way.

How would you strip a quarry like this?



Lengthening the life of belt conveyors by giving them a roof

Nature, Origin and Properties of Sand

Fifth Article—Weight of Sand—Chemcal Composition—Refractoriness

THE WEIGHT OF SAND is an important property. It is related both to its specific gravity and the voids. Dry sand weighs more than wet sand, but not so much as saturated sand. This article, like the preceding ones, is based on "The Sand and Gravel Resources of Missouri," by C. L. Dake, of the Missouri Bureau of Geology and Mines.

Weight of Sand

The weight of sand depends directly on two factors, the specific gravity and the percentage voids; and the voids, as has been noted, are in turn dependent on degree of grading and compactness. In the following discussion, unless otherwise stated, it is assumed that the sand is dry. In ordinary practice, the weight is expressed in pounds per cubic foot or per cubic yard. Among sand users, the common method to find the weight of sand is to fill and weigh a box holding exactly one cubic foot. The weight of the sand may be expressed, either loose or compacted. If loose, the sand should always be poured into the box from a standard height. If compacted, it should be done by means of a uniform amount of shaking, or by a uniform weight placed on the sand.

Where only small samples are to be had, a common laboratory method is to find carefully the weight in grams of a sample of about 100 cc. of the sand. This can be reduced to pounds per cubic foot by the following formula:

$$Wpf. = Wgc \times 62.513,$$ in which

Wpf. = weight per cu. ft. in pounds,

Wgc. = weight per cc. in grams.

This is derived as follows:

$$1 \text{ cc.} = \frac{5}{82} \text{ cu. in.}$$

$$1 \text{ gm.} = \frac{75}{34000} \text{ lb., then let}$$

X = weight of 1 cc. in grams, then

$$X = \text{weight of } \frac{5}{82} \text{ cubic inches in grams.}$$

$$\text{Weight of 1 cu. in.} = \frac{82\,X}{5} \text{ grams}$$

1 cu. ft. = 1728 c. in.

$$\text{Weight of 1 cu. ft. in grams} = \frac{1728 \times 82\,X}{5}$$

$$\text{Weight of 1 cu. ft. in pounds} = 1728 \times \frac{82\,X}{5} \times \frac{75}{34000} = 62.513\,X.$$

Where specific gravity and voids are already known, the following computation may be used:

$$\text{Weight per cu. ft.} = G \times 62\tfrac{1}{2} \times \left\{\frac{100 - v}{100}\right\},$$

in which

G = specific gravity,

V = per cent voids, and

$62\frac{1}{2}$ = weight in pounds of one cu. ft. of water, whence

$G \times 62\frac{1}{2}$ = weight of one cu. ft. of sand if perfectly solid, then

$\frac{100 - v}{100}$ = proportion of actual sand without voids.

The mixture of a small amount of water with dry sand increases its bulk. In the case of most bank sands the maximum volume—and hence the smallest amount of solid matter per unit of volume, that is, the largest percentage of absolute voids—being reached with from 5 per cent to 8 per cent of water.

This is due to the fact that a fine film of water separates the individual grains, actually holding them apart. This is not noticeable in aggregates of one-half inch and above, but its importance increases with the finer sands. As a result, slight moisture actually causes the sand to weigh less.

Though a damp sand may be slightly lighter than the theoretical dry weights computed by the method given above, it is to be remembered that actual shipping weights will frequently exceed the figures given, because as most sands and gravels are shipped directly from the washer or dredge, they are practically saturated, as is plainly shown by the water running from newly loaded cars. With a porosity of 30 per cent a complete saturation of the pores with water would raise a sand weighing 116 lb. per cubic foot dry to about 136 lb. per cubic foot saturated, or from 3132 lb. to 3672 lb. per cubic yard.

Chemical Composition

For most uses to which sand is put, a knowledge of chemical composition is of little or no value. Analyses of such sands are of probable or possible value in glass manufacture, or for moulding sands.

In the glass sands the silica is present chiefly as the mineral quartz (SiO_2) and probably a very small amount combined with the alumina (Al_2O_3) in the mineral Kaolinite, ($Al_2O_3.2SiO_2.2H_2O$) or related hydrous silicates of weathering, since few or no unweathered primary silicate minerals are to be detected in the glass sand formations. The Fe_2O_3 is present largely as limonite ($2Fe_2O_3.H_2O$), or other related hydrous oxides, in the form of an extremely thin coating on the individual grains, more rarely as a cement actually filling the pores. This latter condition is usually found where there is a heavily ferruginous crust, caused by an excessive leaching of iron from the soils or rocks above. The CaO and MgO are probably present as the carbonates, calcite and dolomite, as cementing material.

Computing Al_2O_3 as kaolinite, Fe_2O_3 as limonite, and the CaO and MgO as carbonates, it will be found that the H_2O and CO_2 required totals practically as much as the actually determined volatile constituents, showing that there is but little organic matter present. In a few instances there is not enough actually determined volatile matter to furnish the computed amount of CO_2 and H_2O, which may mean that Fe_2O_3 is present as gothite ($Fe_2O_3H_2O$), turgite ($2Fe_2O_3.H_2O$), or even as hematite, (Fe_2O_3). This would reduce the computed amount of water. In some cases this would still leave a small deficiency which possibly signifies that a very small amount of the alumina, lime, and magnesia may yet remain as unweathered silicates. It might also signify the presence of some weathering product of Al_2O_3 lower in water than kaolinite.

Feldspar, if present might add potash, soda, lime, and alumina; and the ferromagnesian minerals would yield in addition further amounts of iron and magnesia. These minerals are not present in appreciable quantities in glass sand.

In a general way it may be said that chemical analyses yield the following information that is of value for any given sand. For glass making it is desirable to know the content of silica, iron, alumina, magnesia, and organic matter. For moulding sands, esppecially for steel moulding, the content of silica, alumina, iron, magnesia, lime, and alkalies should be known. For fire and furnace sands, the percentage of silica, iron, lime, magnesia and alkalies should be determined. For filter sands the percentage of silica, iron, lime, magnesia, alkalies and organic matter should be determined. For concrete work, it may become desirable to determine the organic matter. According to the Bureau of Standards, there are often made for a building sand: "Chemical determinations of the presence of organic matter, sulphides, soluble alkalies, etc. The chemical tests need not be made unless the material is found to be inferior in quality, and the cause cannot be determined by physical tests."

Refractoriness

Refractoriness is that property which enables a sand to undergo high temperatures without fusing. Pure quartz is in itself a very refractory substance, and consequently, a quartz sand of high purity is fusible only at very high temperatures. Lime, iron, magnesia, and the alkalies act as fluxes and the sands in which these impurities run high are much more easily fusible. The presence of calcite, limonite, and many of the silicate minerals carrying lime, iron, or alkalies, fluxes the sand and reduces its refractoriness.

It is the fusing point of sands that determines their value, especially for furnace and foundry purposes.

Novel Sand and Gravel Plant

Combination of Hydraulic Dredge, Washing, Screening and Stocking Plant, for Which Patent Has Been Applied

DELBERT WHEELER, Le Mars, Ia., has devised a sand and gravel plant layout, for which he has applied to the United States Patent Office for a patent. The scheme is described by Mr. Wheeler in a letter to the editor, as follows:

"Referring to Fig. 1, the operation is as follows: The material is pumped from the pit by means of a hydraulic dredge to the washer and separator and taken from this by a locomotive crane for loading into cars for shipping. The general arrangement of the plant can be as shown in Fig. 1, and provision thereby made for surplus storage if desired.

"The screening and washing process is shown as in Fig. 2. Material (sand, gravel and water) is discharged from the dredge into the receiving spout *A* and from that flows to the screen *B*. Screen *B* is a screen within a screen and the rejections from the inner screen may be discharged to a crusher for reduction to a stone of marketable size as shown in Fig. 1. The rejections from the outer jacket are discharged into a spout *C* and carried to a storage pile *D*. The sand and water which passes the screen *B* falls into a pan below the screen and is carried to a distributing spout *E*, thence through gates *G* into the reinforced-concrete settling tanks *H*. By means of the gate *F* the sand and water can be directed in either sand bin as desired and the cycle of operations is to fill one tank while the other is being emptied by means of the locomotive crane. There is an overflow weir in the tanks *H* and the water and dirt being lighter than sand overflows into the spout *J*, and is carried away while the clean sand settles to the bottom and is retained for market. The degree of purification depends upon the rate of flow of the water through the tanks *H*.

"This system requires a pit with water in it and material that can be handled with a hydraulic dredge. The advantages of the system are as follows:

"It is not necessary to pump against a high static head, thereby saving power and excess strain on machinery.

"The water from the dredge is used in the washing and screening process, saving the expense of operating a separate water pump.

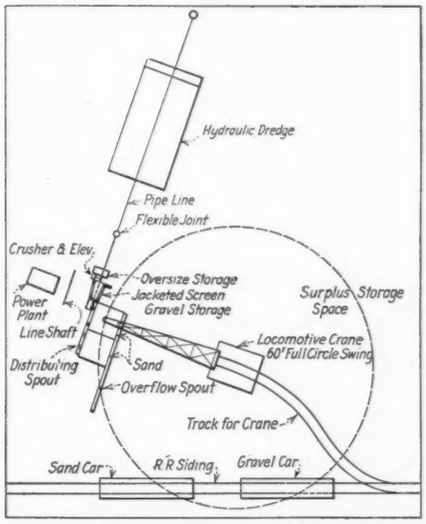


Fig. 1. General layout of Wheeler sand and gravel plant

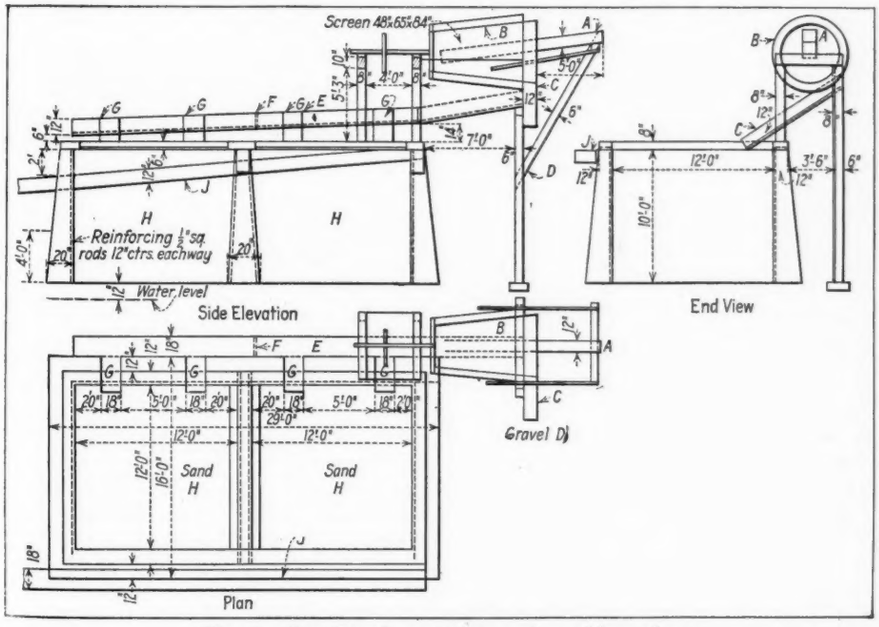


Fig. 2. Details of screening and washing plant

"The very fine sand is taken out in this process and can be reclaimed for asphalt paving purposes, whereas, it would otherwise be a waste product.

"Provision is made for a large surplus storage, a very desirable feature for gravel plants.

"The entire plant can be successfully run with five men, thereby cutting labor costs to a minimum. It is simple and efficient.

"The washer and separator shown is designed for a capacity of 1,000 tons per day and could be increased or diminished in size for other capacities."

Mr. Wheeler writes further:

"There has been considerable said in your columns about the stripping of gravel beds, and this is a perplexing problem on account of the small yardage which it is desirable to use each season. A feature about this layout is the ease with which it could be equipped for stripping. There is a time in the fall of the year when it is no longer safe to ship wet material in cars, and yet the ground is not frozen too deep for stripping. The locomotive crane could be equipped with a dragline bucket and with the long boom a considerable space could be stripped around the edge of the pond and the overburden thrown into the water. This could be done each year, or oftener, if necessary.

Special Lime Supply Wanted

AN INQUIRY has been made by a large chemical company requesting information of a manufacturer who can furnish a pure lump lime in large-sized pieces so that they may be able to cut therefrom blocks 6x6x2 inches thick. These blocks are to be worked up in the chemical company's plant into a sort of bowl formation to be used in a furnace to resist a very high temperature.

It will be evident that the lime required for this work must be particularly free from silica and iron and aluminum oxides. Magnesium oxide would not be objectionable.

Any manufacturer in position to furnish this material will please communicate with the director of the Chemical Bureau of the Lime Association.

New Molding Sand Deposit Found in Canada

GOVERNMENT ANALYSIS shows that the extensive body of molding sand discovered near Brockville, Ontario, is equal in texture to the deposit at Albany, from where all of the molding sand used in Canada has been coming.

A company has been organized to develop the deposit. Orders filled so far have been so satisfactory that the future demand for the sand seems to be permanent.

Mississippi Valley Sand and Gravel Men 100 Per Cent for National Association

Meeting Held in St. Louis, Mo., September 23, Results in Unqualified Endorsement of National Association's Program

ABOUT FORTY representative sand and gravel producers from the Mississippi Valley States met in St. Louis on September 23, at the call of W. P. Carmichael, of the Carmichael Gravel Co., St. Louis.

Harry Donnelly, of Cincinnati, Ohio, president of the National Association of Sand and Gravel Producers, presided. He stated with absolute frankness that the object of the meeting was to interest sand and gravel producers, who were not now members, in the work, aims and purposes of the National Association.

Ably assisted by W. P. Carmichael, chairman of the Membership Committee of the National Association; E. Guy Sutton, secretary; R. C. Yeoman, engineer, and George V. Miller, treasurer, the message was carried home so energetically and so effectively that there was not a single gravel-producing company represented at the meeting by an officer capable of contracting for it which did not become a member then and there.

Secretary Sutton's Address

E. Guy Sutton, secretary of the National Association of Sand and Gravel Producers, gave a very comprehensive and a very forcible presentation of what the Association has already accomplished for the industry, and what its plans for future development are. An abstract of this address follows:

"TRANSPORTATION—The successful operation of a sand and gravel plant depends primarily upon two things: (1), character of the deposit; (2), adequate transportation facilities to markets. There are other important elements to be considered, but if these two factors are satisfactory the others may usually be supplied. We can not alter the character of the deposit, so we will not concern ourselves with its discussion. The question of transportation, involving freight rates and car supply, demands our most careful consideration, and more especially at this time, when legislation is in progress that undoubtedly will embody changes in former methods of operation and control which may include national regulation of freight rates, car supply, and industrial relations.

"INSURANCE—The workmen's compensation rates applied to the sand and gravel industry are exorbitant as compared with other operations far more hazardous. This condition exists, I believe, because we have been rated on experience in other industries, such as ordinary construction work, or quarrying. I have come to this conclusion because when I ventured the opinion to insurance men that our rates were too high they invariably responded that the record of the industry covers relatively so short a time that it is impossible to justify a lower rate. Assuming that the rates were too high in the beginning, the many advances that have been made since have only multiplied the error.

"I have made preliminary arrangements for taking the matter up with the National Workmen's Compensation Service Bureau, which has to do with establishing the conference rates. Also I have given some consideration to the feasibility of mutual insurance for the industry.

"COST ACCOUNTING—In order that cost data (not bookkeeping) may prove of real advantage to the industry there must be as great a uniformity as possible in the methods employed. Especially should the items of cost and the units of volume be the same; otherwise, intelligent comparisons are impossible, as I have found by personal experience when attempting to gather cost data last spring. (Several State associations in the industry have instituted standard cost systems, but all are different.) Then, too, unless I am greatly mistaken, the Federal Trade Commission, or some other Government agency, will eventually prescribe uniform cost accounting systems for each industry. I believe we should anticipate this eventuality by being ready to suggest our own views gained from experience within the industry

"BUSINESS PRACTICES—A definite and uniform code of business principles and practices should be formulated for the guidance of all producers, in which special stress should be laid upon service, quality of materials, public interest and honest dealing.

"FEDERAL LEGISLATION—We have thus far taken little or no interest as an industry in matters of national legislation. We should take an active part in formulating legislation vitally affecting our industry, such as that on transportation, highways, business regulation and appropriations for public improvements.

"STATISTICS—There are no complete and comprehensive statistics of sand and gravel production. I have arranged with the United Geological Survey to co-operate in getting prompt and more complete returns from producers.

"Then, too, there are no data available relative to the amount of capital invested, the labor employed, fuel consumed, and many other items of absorbing interest and of economic importance to the industry.

"ORGANIZE STATE ASSOCIATIONS—It is a well-known fact that cut-throat competition is fast disappearing. This has been brought about in a large degree by men engaged in the same business becoming personally acquainted with one another, which invariably begets mutual confidence—the father of fair dealing. For this reason the formation of State or district associations are to be encouraged. The officers of the National Association will be glad to lend assistance at any time in perfecting such organizations. It may appear desirable later to make the State or district association a unit in the organization of the National Association.

Why I Support Association Work

I CONSIDER the dues my company pays for Association membership just as important and just as necessary an item of production cost as the salary of a clerk or the repair of a machine.

In the conduct of this business today—in the conduct of any business of consequence—the power or capacity of an individual, or an individual concern, is strictly limited. The Association does things for my business, such, for instance, as assistance in getting adequate car service from the railways, which I, as an individual, can not do.

Membership in this Association is a business necessity.—W. P. Carmichael.

"EXTENDING USE OF SAND AND GRAVEL—The course of action is plain: By tests and experiments we must learn more and know most about sand and gravel; by proper preparation, both as regards grading and washing, we must enhance the quality of our product and protect its good name, for inferior material coming from only a few plants may give sand and gravel in general a bad reputation. Without depreciating competing materials we must proclaim the good character of our own; we must find new uses for our materials, especially for the smaller sizes of gravel which, in many sections of the country, predominate.

"Now to fulfill the foregoing purposes it is obvious that the establishment of an engineering department, well manned and equipped, will be required. As previously announced, we have made a start in this direction. By a co-operative arrangement with the Indiana Association we have secured the part time services of R. C. Yeoman, formerly a professor of highway engineering at Purdue University.

"Last week while in Washington, D. C., I made preliminary arrangements with J. E. Pennybacker, formerly with the U. S. Bureau of Public Roads, now secretary of the National Asphalt Association, to investigate the practicability of using gravel to a greater extent in combination with tar and asphalt for road building—a field which as yet has hardly been touched.

"It is planned to have Mr. Yeoman and Mr. Hubbard, the chief engineer of the Asphalt Association, co-operate with Mr. Goldbeck, testing engineer of the U. S. Bureau of Public Roads, in devising and carrying to conclusion a series of tests and field experiments which will form the basis of an exhaustive study of the subject.

"Incidentally, while talking with Mr. McDonald, acting director of the Bureau of Public Roads, relative to the foregoing matter, the question arose as to the desirability of making use of the surplus fine material obtained in the production of gravel. Mr. McDonald stated that he thought it quite possible to make more general use of this otherwise waste product in various types of road construction, and he would favor tests designed to develop such uses. Can we afford to neglect so great an opportunity as is afforded by these two instances? Yet these are only two examples of what may be done through co-operation with other associations and with Government agencies having to do with matters directly or indirectly affecting our industry."

R. C. Yeoman, engineer of the Association, elaborated upon these matters referred to by Mr. Sutton.

Publicity Work

Guy C. Baker, executive secretary of the Ohio Sand and Gravel Producers Association, and editor of this association's monthly bulletin, described the plans for the new monthly magazine of the National Association. (The National Association has taken over the Ohio Association Bulletin, of which Mr. Baker will continue as editor.)

Mr. Baker explained that the main idea of the new magazine was to furnish a medium of publicity between the members and prospective members of the National Association. It is designed to be self-supporting, but is not to be run as a money-making proposition. Eventually, its circulation will include contractors, engineers, architects and highway officials throughout the country, and it will carry to them the message of the gravel man.

The "National Sand and Gravel Bulletin" will contain the following departments: (1) Special articles; (2) editorials; (3) transportation matters; (4) engineering matters, specifications, new uses for sand and gravel, etc.; (5) current topics such as cost-accounting, insurance, etc.; (6) association activities; (7) personal items; (8) correspondence; (9) classified advertisements.

Other speakers were H. C. Huffstetter, president of the Indiana Association; J. J. Weaver, Ludlow, Ky., and George V. Miller, treasurer of the National Association. Mr. Miller said that the Indiana Association had come to be so important to his business interests that his firm would carry the entire expense of it rather than go without it.

Provide Liberally for National Association

A committee on finances was appointed, of which John Prince, of the Stewart Sand Co., Kansas City, served as chairman. The result of the work of this committee was that every member present agreed to do his part in guaranteeing the National Association sufficient funds to carry out its program. Similar meetings will be held in other parts of the country, and if other sand and gravel men respond, as did those of the Mississippi Valley, the National Association will soon be in a position to accomplish what far-sighted producers see must be accomplished if the industry is to prosper.

Portland Cement Industry of France

SIR—I have just received this day ROCK PRODUCTS of August 2, and read the note about cement production in France, and I beg to rectify a few errors in the name of A. Lavocat, President of the Chambre Syndicale des Fabricants de Ciment Portland de France.

The oldest and greatest district for portland cement in France is Boulogne sur mer, in Northern France, and the immediate neighborhood south of Boulogne, where white marly chalk and clay are to be found, and are used for portland cement since 1849. Desvres, Dannes and Neufchatel are in this district, the total production of which amounts to about 700,000 tons, with the new works and new mills at old plants installed just before the war.

Marseille is on the other side of France on the Mediterranean Sea, about 550 miles from Boulogne in straight line (about the distance from Detroit to New York). Marseille is 150 miles south of Grenoble and is the great port for export of the Rhone and Isere region products: portland and quick-setting cements of Grenoble, white and gray portland cement, and hydraulic-lime of Viviers.

The total production of France can amount to about 3,000,000 tons of portland cement (with Alsace-Lorraine), and about 6,000,000 tons of hydraulic materials, including portland cement, natural cement, slag cement, quick-setting cement and hydraulic lime. About 300,000 tons of portland cement were shipped before the war, each year, to French colonies and foreign countries.

French production would be quite sufficient for the actual needs of the country. But lack of transportation facilities and lack of coal since 1914 very badly hamper the output of the works. Before the war France produced 40,000,000 metric tons of coal, and wanted 60,000,000 tons, 20,000,000 of which came from Great Britain, Belgium and Germany. Now, after the studied destruction in Northern France by Germans of mines yielding 20,000,000 tons, France can only produce about 35,000,000 tons (with the Sarre Basin), but wants 75,000,000 tons (with Alsace-Lorraine).

A. LAVOCAT,
Neufchatel, pres Boulogne sur Mer
August 26, 1919.

Strike Closes Gypsum Mine

CENTERVILLE, Ia.—Workers in the gypsum mine went on strike here for the Fort Dodge scale of wages.

They were being paid the mine day work scale, which is $5 for mine work and $4.23 for top work. The Fort Dodge gypsum scale is about a dollar a day higher for a part of the work, and almost $2 for other parts.

The mine and mill here have just begun to show a profit for the stockholders after being in operation since early in the summer and the board of directors say they will close the mine until labor can be had at the mine scale.

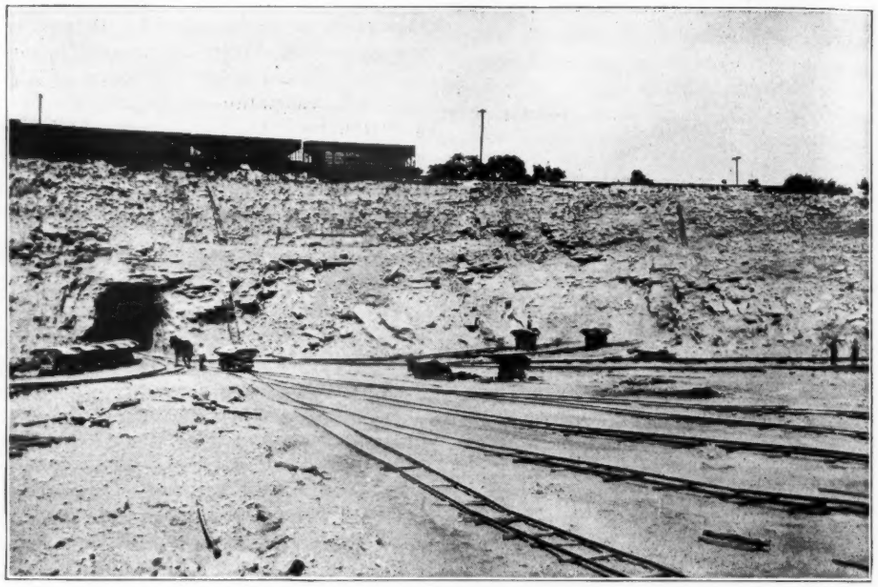
Labor-Saving Methods at the National Stone and Lime Co. Plant

Will Replace Hand Picking Method of Producing Kiln Stone With Large Steam Shovel, Scalper-Screen and Concrete Storage Bin

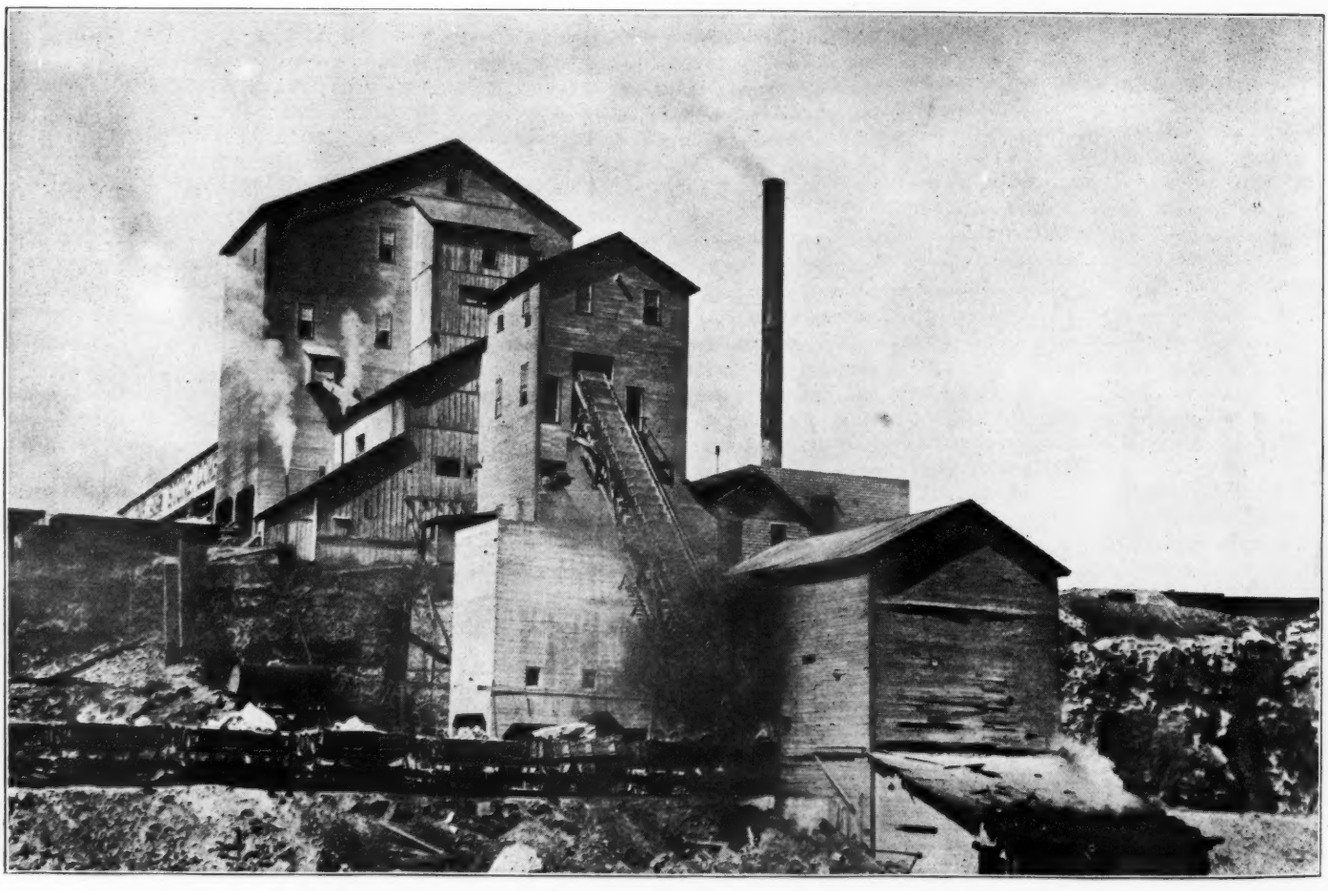
THE MOST INTERESTING features of the National Stone and Lime Co., Carey, Ohio, are the methods which are being introduced to reduce hand labor. Up to the present time this company, which produces 150 tons of hydrated lime and 2,500 tons of crushed stone per day, has quarried all of the stone used for the lime kilns by hand.

Owing to the ever-increasing difficulty of securing the required labor, even at the present wage scales, arrangements have been made to put an end to this method entirely. A cylindrical scalping screen, 72 in. in diameter and 16 ft. in length, has been installed at the end of the plant where the quarry stone is received, as shown in the views. A large concrete, hopper-shaped storage bin, of 250-ton capacity, has been built to receive the oversize from this scalping screen.

As soon as an additional 91-ton steam



Hand quarry operation which is to be replaced by steam shovel operation



View of plant from pit, showing location of crusher, elevator and the concrete bin to be used for kiln stone

shovel, with a 3½-yd. bucket which has been ordered, is delivered, the hand method of rock quarrying will be discontinued. All material will be steam-shovel loaded into side dump cars and hauled to the initial crusher, which is located in a pit at the foot of the elevator.

The 48 by 60-in. jaw crusher, which is fed from a steel hopper by an apron, reduces the run of quarry to 10-in. size.

This material is elevated to the scalping screen, where all over 6-in. is rejected and chuted to the concrete storage hopper. Side chutes provide for its being loaded into cars and being hauled to the foot of the kiln incline by a steam locomotive and drawn up the incline to the kilns by a hoist engine.

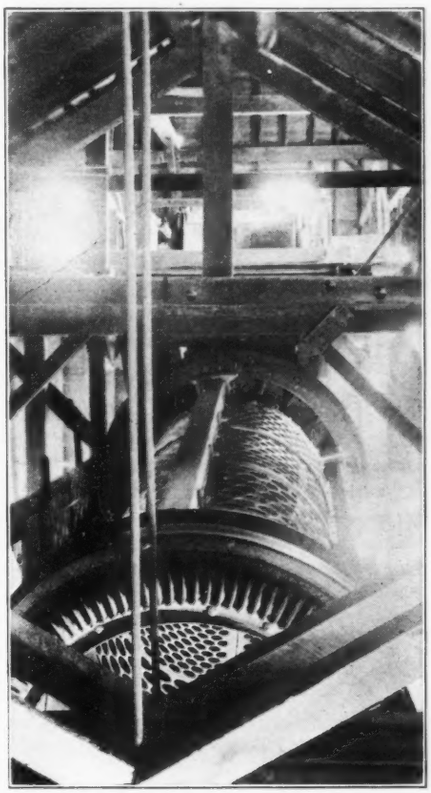
This arrangement is expected to be much more satisfactory than the former hand-labor system.

Kiln Coal Handling

Another method of saving labor is in the handling of the coal. It is delivered to the plant in hopper bottom cars and dumped on a trestle, beneath which is a steel pan and conveyor. This feeds the coal to a crusher, from which it is elevated to bunkers on each side of the kilns above the firing floors. A screw conveyor distributes the coal the entire length of the kiln house, depositing it upon a concrete floor in front of each kiln. A chute and stop gate in front of each of the 14 kilns enables a complete distribution of the coal.

The coal-handling machinery is all motor driven. The hydrating plant proper is operated by steam.

Although the kilns are hand fired at present, overhead chutes provide automatic feed if it should become desirable.



Scalping screen to reject kiln stone

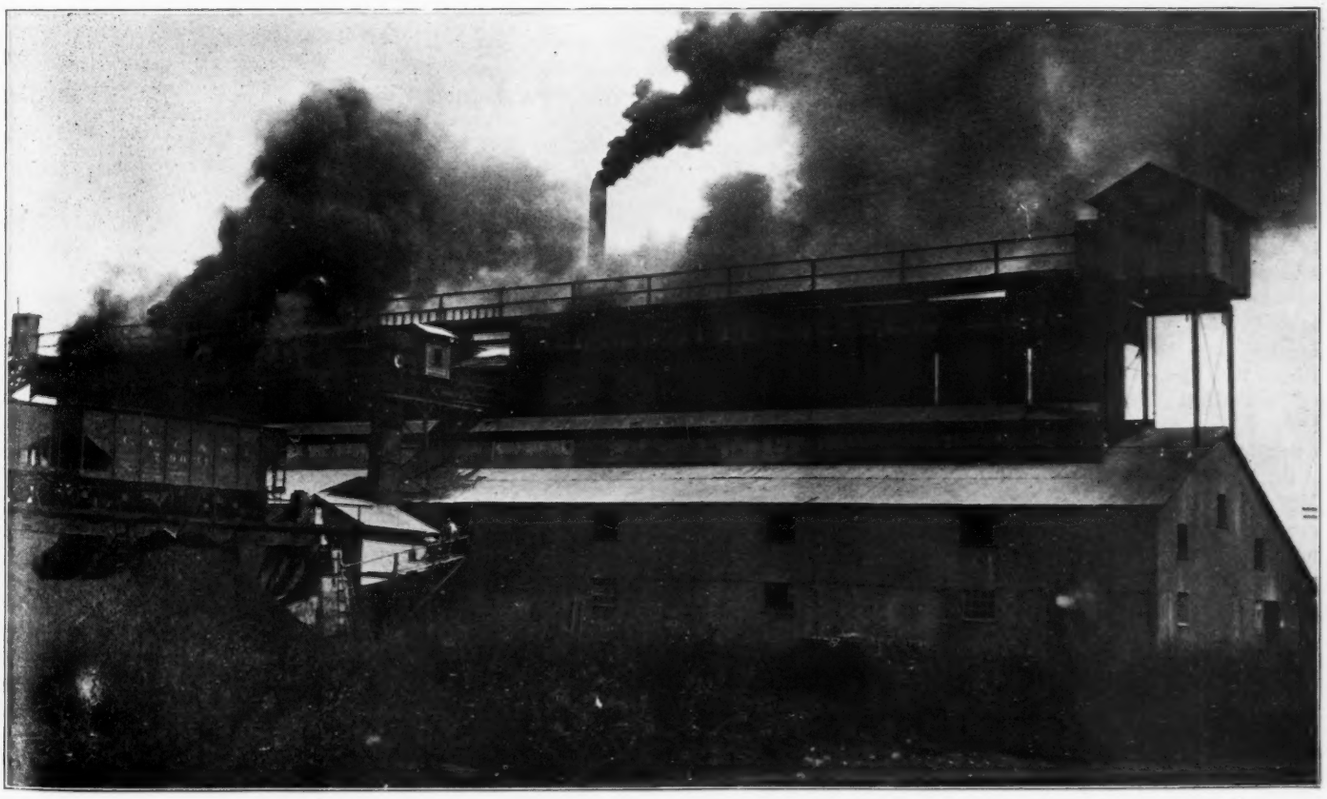
Wisconsin Lime Industry Has Bright Future

AN INDUSTRY of Wisconsin which ought to develop considerably during the next decade, says A. P. Haake, of Wisconsin University, is the manufacture of lime and building materials.

"Illinois does not possess the same grade of stone found in Wisconsin, hence Chicago is a great lime market for our manufacturers. There are about ten lime companies in the State, several of them operating from three to six plants each. The product is shipped principally to northern Illinois, Iowa, Michigan, Minnesota, Indiana and South Dakota. Freight rates prevent Wisconsin lime from going to more distant territory.

"With the boom in building that is sure to come, there ought to be a tremendous increase in the demand for building materials, and since the companies operating can not increase their output greatly without adding to their equipment, and as there are limestone deposits as yet untouched, there is real opportunity for the investment of additional capital in this industry.

"What will likely happen is that the present companies will increase their production activities. They suffered during the war, producing only about 35 per cent of the normal output for the last two or three years, and welcome an appreciable increase in the demand for their product."



View of kilns, showing how coal is handled from hopper-bottom cars to firing floor

Comments on Caustic Lime for Agricultural Purposes

What Some Agricultural Men Said About the Use of Caustic Lime As a Fertilizer

THE DIRECTOR of the Agricultural Bureau of the Lime Association has just completed a trip to several important centers to ascertain, among other things, the sentiment in regard to the use of caustic lime for agricultural purposes. According to a report from the Agricultural Bureau the trip was very successful.

Michigan State College of Agriculture

At the Michigan State College of Agriculture at Lansing, Professor Patten, head of the Department of Agricultural Chemistry, was interviewed.

Dr. Patten stated that he does not accept the many times repeated statement that caustic forms of lime destroy humus. He favors the use of such forms where cost of oxides on the land and convenience in handling make them more suitable for the farmer than the carbonate form. He believes that only carbonate material of about one-sixtieth of an inch fineness is fine enough to be effective in the soil in any reasonable time.

In the only bulletin on agricultural lime published by that station and written by Dr. McCool and Mr. Miller of the Soil Department, a similar stand on fineness is taken. In the same bulletin it is pointed out that on muck soil, caustic lime is likely to be most beneficial.

Agricultural College, Madison, Wis.

In addition to visiting member companies in Eastern Wisconsin, the Agricultural College at Madison was visited and a considerable number of members of the staff were interviewed. Chief among these was Prof. A. R. Whitson, head of the Department of Soils, under whose direction is the chief investigation of lime problems in relation to soil fertility and also much of the educational work affecting lime materials.

Prof. Whitson, like Dr. Patten of Michigan, is not opposed to the use of caustic forms of lime, and attributes the predominant use of limestone (estimated at 95 per cent of all lime used on the soil) to the more aggressive campaigns carried on by limestone manufacturers.

It is also undoubtedly true that the personal influence of the institution has been more heavily in favor of limestone than burned forms of lime. This has been especially true of Mr. Wier in immediate charge of the work affecting the use of liming materials on the soil. He has been largely responsible for the promotion of the portable limestone pulverizer. Mr. Wier has now left the college.

In the minds of several of the men there, the idea still persists that caustic lime is directly destructive to organic matter. It was the privilege of Prof. Fippin to bring to their attention the data showing that idea to be erroneous.

There can be no question that this contact with the men in responsible agricultural positions is very wholesome. If conscious that their position is likely to be challenged on the basis of facts, their statements will be more thoroughly weighed and are more certain to be free from what might otherwise be unconscious prejudice.

Chicago and Middle Western Farmers

The Western office of the Soil Improvement Committee, Chicago, Ill., supported by the fertilizer industry, is in charge of Prof. W. B. Hurd, formerly director of Agricultural Extension in the Massachusetts Agricultural College at Amherst. That office is fully conscious of the dependence of fertilizers on the proper use of liming material if the fertilizer is to have its full effect on crop growth. He also finds the farmers of the Middle West very much interested in the use of lime.

Highways Transport Committee Discontinued

GROSVENOR B. CLARKSON, Director, United States Council of National Defense, announces that:

"The Highways Transport Committee, which was established by the United States Council of National Defense, as a necessary adjunct to its war-time activities, has been discontinued.

"The chief reasons for dissolving the committee were necessary curtailment of expenditures and the apparent fact that the war-time functions of the committee did not with sufficient explicitness fall within the peace-time activities of the Council, as laid down by the Congressional Act creating it.

"The Council, by order of the President, recently took over the records and files of the War Industries Board, originally created by the Council, and of the Committee on Public Information. All of this material will be studied and, where practicable, kept up to date.

Lime Association's Soil Tester Ready for Market

THE SIMPLE DEVICE exhibited at the Lime Association convention in Pittsburgh last June, with which an amateur could determine the approximate lime requirement of soils, has been perfected so that it will soon be ready for distribution in quantity lots. It is presumed that the Lime Association, with the same spirit of co-operation invariably shown, will make it possible for any one to obtain one of these testing devices.

General Manager Hall reports in the "Weekly Bulletin" of the Association:

"The first practical field demonstration of Mr. Whipple's instrument for ascertaining graphically the amount of lime required to neutralize the acidity of any given soil was made on Tuesday of this week. Two members of the Association staff went out into the country about twelve miles from Washington, found a farmer who owned and operated his own farm, explained to him the nature of their errand, and secured his hearty co-operation. He directed them to a field which he said he knew was sour, although part of it had been limed. They made some tests of two different plots of ground.

"The land was low-lying and obviously in need of lime. One section of it had been treated with 1,500 lbs. per acre of hydrated lime three or four years ago and timothy and red-top had been grown on it ever since.

"The soil-testing instrument showed that it needed 1,750 lbs. per acre of lime to make it neutral. The adjoining plot of ground had never been treated with lime. The instrument showed that two tons per acre were required to correct its acidity.

"The farmer was a typical representative of the average type. He was greatly interested in seeing the determination made before his eyes because, while he had always known his land needed lime, he could not tell how much to put on it. Needless to say, he wanted as promptly as possible to secure one of these instruments so that he could make his own determinations for himself. The farmer applied the titrating fluid to the acid extract of the soil and saw, himself, the very interesting results.

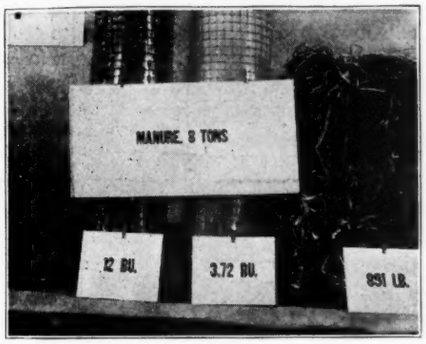
"The chemistry and mathematics of this method of testing soil have been finally and definitely worked out. It is probable that some of these instruments will be available at some early date for those who wish to use them. It will be extremely helpful in arranging for their production in quantities if members will intimate to us how many, if any, they can use at a cost of approximately $5 each for the complete outfit, provided, of course, they are satisfied that the instrument will do what we believe it will."

Interest in Agricultural Lime at Ohio State Fair

Exhibits by Ohio Agricultural Experiment Station, National Agricultural Limestone Association, and Ohio State University

THIS YEAR'S OHIO STATE FAIR will go on record for an unusual demonstration of the use of agricultural limestone and as a time when the farmers of Ohio were instructed in first-aid treatment of their soils. The work was carried on by three distinctly separate organizations—the Ohio Agricultural Experiment Station, the National Agricultural Limestone Association, and Ohio University.

The Ohio Agricultural Experiment Station's display was under the supervision of Dr. C. E. Thone, director of that department. The accompanying views illustrate the agricultural limestone part of the exhibit.



Increased yield due to use of manure

These views represent the 12 years' average increase per acre—1905 to 1916—produced in a 3-year rotation of corn, oats and clover. The land in one case received 8 tons of manure per acre only, and in the other case the same quantity of manure was reinforced with 1780 lbs. of ground limestone. The manure was plowed under for corn and the limestone applied to the surface and harrowed in before planting the corn.

These experiments were performed by the station, and the display was to show the results graphically.

The National Agricultural Limestone Association exhibit consisted of two parts. One was a large sign of some 12x6 feet in dimensions which was arranged in the following manner: Across the top was printed in bold, black type, "Which Way Is the Old Farm Going?" "Look at Your Soil Analysis and Then Look at This."

Immediately below this, and arranged horizontally across the sign were samples of alfalfa, red clover, alsike clover, timothy, red top and sorrel. Below each sample was the standard test for soil in which each would grow best. The samples were arranged so that the acidity of the soil increased for each specimen and test.

Demonstration of Soil Test

In connection with this, a soil-testing exhibition was carried on. Farmers were asked to bring or send samples of their soil, which were tested before the public. The litmus, the acid and the standard Lime Association tests were used. The work was performed by Mr. Allen, who was selected by Professor Bair of Ohio University.

Great interest was shown in the work, 194 samples being submitted from 57 counties of the State. This work not only showed the farmers the conditions of their soil, but also taught them how to perform the test. It was found that northwestern Ohio in general was in need of limestone. This work was under the direction of C. R. Wagner, field demonstrator of the National Agricultural Limestone Association.

Ohio State University exhibited a very interesting soil map of Ohio, so marked with limestone screenings as to show where and in what quantities limestone was needed about over the State. Much interest was shown by all visitors in the agricultural limestone exhibits.

Increased yield due to use of manure and limestone

Bureau of Standards Encourages Use of Air-Tight Containers for Lime Shipment

AN EXTENDED CONFERENCE took place on Tuesday of last week at the offices of the Association, at which the Bureau of Standards was represented, as well as one of the manufacturers of air-tight containers, according to the weekly Lime Association letter.

The Bureau of Standards is of the opinion that the air-tight container falls under the description, "Barrel," as contained in the Standard Lime Barrel Law, and the suggestion was made that in order to permit the use of the air-tight container without violating the law, it be made in a sufficient number of sizes so that 180 pounds of lump lime, regardless of its specific gravity, can be contained in one or the other of the standard sizes, and that a larger sized container be made to accommodate this weight of hydrated lime for those who desire to ship hydrate in barrels.

The attitude of the Bureau of Standards is to encourage, by every possible means, the use of this new type of container, provided the industry desires to use it. It is obvious that the industry does desire to use it because already orders have been placed by many manufacturers for large numbers of these containers.

Some members of the Lime Association have advised that the Standard Lime Barrel Law should by no means be amended. Comments of members are invited upon the above suggestion as to a workable and satisfactory means of bringing this new type of container within the meaning of the Standard Lime Barrel Law. It seems from all the information at hand that it is perfectly feasible to use the steel barrel without violating the law, and that no amendment is necessary to accomplish this. Comments are to be made to Association headquarters.

Cement Exports and Imports for July

WASHINGTON, D. C.—Little or no cement is now being imported into the United States, according to figures compiled by the Department of Commerce, and it is probable that it will not be long before that commodity is practically crossed off the import list. Only 3,400 pounds, valued at $45, were imported during the month of July.

Exports of cement, however, are increasing steadily, 285,921 barrels, worth $866,611, being distributed among some 35 foreign markets during the month. Brazel is by far our most important customer, with Argentina and Cuba in second and third places, respectively.

The following table, prepared for the Washington Bureau of ROCK PRODUCTS by experts of the Department, shows in detail the exports of cement to important countries during July:

Countries	Barrels	Dollars
Canada	849	3,311
Panama	16,111	48,082
Mexico	9,739	32,511
Trinidad and Tobago	500	1,465
Cuba	44,601	130,295
Argentina	49,393	162,863
Brazil	116,094	339,561
Chile	5,997	18,832
Colombia	13,357	38,691
Peru	7,175	20,663
Venezuela	5,966	17,826

Michigan Has State Institution for Promotion of Limestone

Survey of Limestone Deposits of Michigan Available for Agricultural Purposes Being Made

MICHIGAN AGRICULTURAL DEVELOPMENT ASSOCIATION—an organization which was formed at the instance of that progressive leader, Hon. A. C. Carton, secretary of the Public Domain Commission and Immigration Commissioner whose services were recently lost to the Wolverine Commonwealth, is sponsor for an ambitious program for the furtherance of agriculture. The association has recently taken steps to investigate the sources of lime in Michigan and to work with the county agents in Michigan to secure a supply for many years at low cost.

Experts have estimated that the loss sustained each year by farmers because they do not use limestone runs into the staggering billions. Instead of **Production** the neglect in its use spells **Reduction.** Ground limestone rebuilds soil and makes it more efficient and this is an era of **Efficiency** in every line of endeavor. It is a mark of **progressiveness,** of **greater crops, of blue ink instead of horrid red lines on the monthly bank balances,** of **increased farm values** and of a **happy and prosperous community.**

A Systematic Plan

Some of the communities in the United States who have preceded Michigan in this all-important work have gone about this project in a systematic way. There are possibly some valuable lessons to be gained from their experiences. In this connection, their scheme was to make a survey of each community; to tabulate a list of the farmers who made use of limestone and of those who failed to do so; to ascertain the tons used by each farmer, the number of acres limed, and the number of tons applied per acre; to list the varieties of crops grown on limed land; to secure accurate data on the increased production on land that was limed as against land that was not so treated; to compare the values of farms on which limestone had been generously used with the value of farms on which it was not used, and finally, from a careful study of the data thus gathered, to show the results were invariably highly interesting.

The farmer who neglects his soil is a slacker, and the slacker, whether in **broadcloth** or in **overalls,** is held in no great respect in the community. A **100-per-cent American farmer** is the one who **keeps his soil in the highest state of efficiency.**

Once all these preliminary things were done, the scheme went even further. Commercial clubs, county superintendents of schools, county agents, limestone clubs, community clubs, or special committees appointed for the purpose organized "get-together" meetings.

Special Programs

Farmers, their wives and children were invited to join the bankers, merchants, doctors, lawyers and business men in these gatherings, which were held in the country on or near the farm of some farmer who had been using limestone. These gatherings were heralded under various names as, for instance, a Farmers' Picnic Dinner, a Limestone Institute, a Limestone Picnic or a Limestone Short Course. A full day's program was usually put on. Demonstrations were made during the day and sometimes motion pictures on these themes were offered at night. Practical talks were given by farmers who have made use of limestone and the actual results which they achieved were brought out. These talks usually ran about five minutes each. One farmer gave his experience with limestone in growing clover; another in promoting the cultivation of alfalfa; a third in wheat culture; a fourth in raising legumes, etc.

Following these talks, the bankers, merchants and lawyers were called upon for brief remarks intended to bring the farmers and town people in closer relation, so that a mutual welfare spirit might be created.

Incidentally, the ladies and children who were interested in other subjects than limestone, had a program of their own, discussions on gardening, poultry, canning and home-economics in general.

Impetus to Agriculture

In this way, a general impetus was given to production along all lines. This was carried on such a successful scale that certain institutions in these sections had specially prepared moving picture reels on dairying, limestone and other phases of farming prepared simply to promote the general welfare.

Michigan's Agricultural Development Association is already making preparations for a vigorous campaign along original lines.

George Lusk is secretary of the Public Domain Commission. (From the "Pere Marquette Service," February, 1919.)

Illinois Penitentiary in Unfair Competition with Producers

THE OUTPUT of the state penitentiary in southern Illinois is very seriously injuring the ground limestone business of legitimate producers, according to E. J. Krause, vice-president and general manager of the Columbia Quarry Co., St. Louis, Mo. The penitentiary is offering finely ground stone to the farmers at a price of $1 per ton, which any quarryman knows does not begin to represent the cost of production.

Injury is done not only by taking so much tonnage away from legitimate business men and taxpayers, but an almost irreparable injury is done the whole industry by this continual agitation on the part of state agricultural authorities to continue the farmer's belief that agricultural limestone costs practically nothing to produce.

In protesting to Dr. C. H. Thorne, director of the Department of Public Welfare, State of Illinois, Mr. Krause wrote: "The penitentiary establishes a price that is below the cost of production, as can be shown and proven by us, and, to that end, we would even be willing to submit our books to experts, which would prove that the penitentiary is unfair competition and a menace to the limestone industry. I note that you say you have protests against the high price charged. The foregoing statement is our reply to this. No intelligent person can consistently protest against the price at which limestone is sold in this state, as to our certain knowledge it is the lowest price in the United States, and no one can prove that the price is high when cost of production is considered.

"Replying to that part of your letter in which you say that if you were to 'Multiply your output by ten the field of demand would scarcely be touched,' this might be true of the state as a whole, but it would certainly render useless and valueless all of the pulverizing machinery in our section of the state.

"The surest way to insure a plentiful supply of ground limestone is to put this business on a basis where quarry operators are warranted in investing additional sums of money to increase their output, and the surest way to bring about a shortage of this material is to continue to sell the output of the penitentiary at a price just under the cost of producing ground limestone by free labor."

This is a case where the individual producer is entitled to and should have the support and backing of the entire industry. The same problem has been met in other states with penitentiary brick plants, broom manufacturies, shoe shops, etc., and it is a pretty well recognized principle that the state convicts should not compete on unfair terms with the free labor of any industry.

Government Report on the Prices of Lime, Cement and Aggregates

Work of the Division of Planning and Statistics of the War Industries Board Published

AS IS WELL KNOWN, the War Industries Board attempted an elaborate investigation of the costs of production and the prices of various commodities, including building materials, such as cement, lime, sand, gravel and crushed stone. The results of this investigation are now ready for distribution as "W. I. B. Bulletins," Nos. 39 (Prices of Sand and Gravel); 40 (Prices of Quarry Products), and 41 (Prices of Cement).

Sand and Gravel

Tabulations of prices are shown for Erie, Pa., and vicinity; Chicago, Alton, Ill., and vicinity; Ohio, Maryland, and Pittsburgh Pa., from 1913 by quarter years to the end of December, 1918.

About all these tabulations show is that prices did not increase materially until the latter part of 1915 or the early part of 1916, when the rise began, and continued pretty regularly to the end of 1918—as far as the table goes—when prices were just about double the 1913 prices.

The advances in various localities differed very much, being more in the East than in the Central West. For instance, the increase for the Erie district was from 28¾ cents to 70 cents per ton for fine building sand, while the advance in the Chicago district was from 21 cents to 40 cents per cubic yard. The greatest increase has, apparently, been in Maryland glass sand, which sold for 1.22½ cents per short ton in 1913, and for $3 in December, 1918.

One thing the tables do show is that there is absolutely no uniformity of prices in various parts of the country for the same material, nor was the price advance by uniform jumps, which would show any concerted action by producers. The bulk of the price advance, which came after January 1, 1916, was very regular and steady, which can only mean that producers were merely keeping up with costs.

According to this investigation, the prices of sand and gravel have just about kept pace with the advance in prices of all other commodities combined, i. e., increased just about 100 per cent since 1915.

Crushed Stone

It is stated that: "Stone prices have not increased as rapidly as the prices of other related commodities, owing to competition within the industry itself and competition with other materials. Building limestone has competed with building granite and building marble and all have suffered from the competition of lumber, brick and cement. The manufacture of 'artificial stone' blocks has curtailed the demand for building stone. On the other hand, while the consumption of crushed stone has undoubtedly increased, the producers could not take advantage of this increased demand on account of the abundant supply of such stone.

"The high point reached by the prices of limestone flux in comparison with the prices of other crushed stone is the significant feature. While the demand for crushed stone for concrete, road metal, and railroad ballast was either stationary or declining, the demand for limestone for flux was increasing because of the great blast-furnace activity. Consequently the increase in wages showed their full effect in the rising prices of limestone flux. The production of flux corresponds closely to the trend of pig-iron production, and hence to the general trend of business conditions. Thus the limestone flux production dropped from the high level of 22,629,961 long tons in the prosperous year of 1913 to 15,298,756 long tons in the depression of 1914, and then under the stimulus of the war's demand for pig iron it rose successively to 18,998,723, 23,603,508, and 25,053,714 long tons in 1915, 1916, and 1917, maintaining the latter level in 1918.

"The price of crushed limestone for railroad ballast did not advance as rapidly as the price of crushed limestone for furnace flux. This was the result of the difference in the demand for the two kinds of stone, furnace flux being urgently needed by the blast furnaces, while use of crushed stone for ballast was subject to the competition of sand and gravel as well as a decline in the total demand for ballast."

In general, the tables for crushed stone show identical results with the price movement of sand and gravel. The price just about doubled from 1916 to 1918, except for fluxing stone, which nearly trebled in price during that period.

Cement

In view of the recent prosecution of Eastern cement companies for alleged violation of the anti-trust laws, the report on cement prices is of more than ordinary interest. The graphs and tables show that the price of cement advanced less from 1915 to the end of 1918 than did any of the other rock products. The price increased less than 80 per cent, in contrast with a 100 per cent increase in all other commodities combined.

The report has this to say about production and prices since 1913:

"The decline in cement prices from 1913 to 1914 and 1915 was the result of sharp competition between cement mills with productive capacity over 50 per cent in excess of the output. The subsequent rise in the price of cement from 1916 to 1918 was due to rapidly increasing wages and fuel costs. On the whole, however, cement prices did not rise as rapidly as the prices of other building materials.

"The production of cement was stimulated by the competitive struggle between the various mills, which brought about over-production and a decline in prices. The production of portland cement in 1913 was 92,097,131 barrels, almost 10,000,000 barrels greater than that of 1912, which had been greater than the production of any preceding year. In spite of this large production and the business depression of 1914, the production of 1914 was maintained at the high level of 88,230,170 barrels, which was greater than the market could absorb The stocks of portland cement, 12,893,863 barrels, at the end of 1914 were the largest in the history of the business.

"With production reduced to 85,914,907 barrels and the stocks at the end of 1915 less than at the end of the preceding year, business became prosperous again. Building operations during 1916 were 25 per cent greater than in the preceding years. The cost of concrete buildings in the leading cities of the country increased from $31,000,000 in 1915 to $51,000,000 in 1916. Under the influence of this heavy demand cement prices rose. Stocks at the end of 1916 were reduced to 8,360,552 barrels. Production in 1916 increased to 91,521,198 barrels, and this increase continued throughout 1917, when a new high-water mark of 92,814,202 barrels was reached.

"The entry of the United States into the war caused a curtailment of building activity. The resolution of the War Industries Board, March 21, 1918, discouraged building operations during the war and in combination with the scarcity of labor and the high cost of materials reduced the amount of building in 1918 to less than 40 per cent of that in 1916.

The decline in the production of cement, however, was not as great as in some other building materials, the output in 1918 falling to only 71,632,000 barrels, or three-fourths of the 1917 production. This was due to the fact that cement was used in the war program to the extent of about 11,000,000 barrels during 1918 for the construction of armories, barracks, gun emplacements, trench linings, bombproof shelters, magazines for explosives, sea walls, wharves, dry docks, incinerators, munition factory buildings, warehouses, barges, ships and even for certain structures in the interior of battleships. The fact that cement manufacturers were limited to 75 per cent of their normal coal requirements did not impose much additional restraint upon production because the decline in building had already curtailed the normal demand for cement."

Lime

The subject of price advances in lime is rather briefly covered in the bulletin on "Quarry Products" where it is stated:

"The advance in the prices of lime was somewhat lower than the advance in the prices of other building materials, but it corresponded very closely to the trend of cement prices. The cost of producing lime is analogous to that of producing cement, cost being about equally distributed between fuel, labor, and overhead expenses, while the decline in the demand for lime of about 25 per cent was about equal to the reduction in the demand for cement. The increased use of lime for chemicals and an undiminished use for agriculture partially offset the drastic reduction in the consumption of lime in the building trades. The consumption of agricultural lime was somewhat limited in the early part of 1918 by a lack of cars, and later by the order of the War Industries Board of August 1, requiring farmers to procure certificates if they desired to purchase more than one ton a year. The car shortage was relieved as early as March, 1918, when the Railroad Administration gave agricultural lime a preferred classification for 60 days, but the restriction of the War Industries Board was not removed until October 19, 1918, when State experiment stations were delegated to supervise the distribution of lime. The production of lime increased from the low point of 3,380,928 tons in 1914 to a maximum of 4,073,433 tons in 1916, from which it declined to 3,038,000 tons in 1918."

Conclusions

If any conclusions are possible from these bulletins they must be to the effect that price advances in rock products have barely kept pace with price advances in everything else and that there is not the slightest evidence of any concerted action in boosting prices at any particular time.

Washington Decision on Open Top Car Distribution

E. Guy Sutton Makes Trip to Washington—W. C. Kendall's Telegram to Regional Directors Says: "Commodities Requiring Open-Top Car Service Must Get Their Fair Share of Such Equipment"

ON AUGUST 20 the Car Service Section of the United States Railroad Administration issued Circular CS 69 for the prime purpose of restoring to service open-top cars of low capacity (75,000 pounds or less) which have been in storage. The circular further prescribes that cars of higher capacity should be used preferentially for the transportation of coal.

This latter provision of the circular was almost universally interpreted by the railroad operating officials to mean that cars of low capacity only were to be furnished for sand and gravel loading which, in effect, resulted in the discriminatory distribution of open-top cars in most sections of the country.

The situation became so acute that it became necessary for E. Guy Sutton, Business Manager of the National Association of Sand and Gravel Producers, to make a trip to Washington. At that time he succeeded in getting the Car Service Section to address the following message of proper interpretation that should be placed on the circular:

> To All Regional Directors: The movement of road building materials has reached such proportions, and complaints received here indicate such divergence of policies maintained by various railroads, we feel the necessity of outlining our general policy in the matter. It has been decided that we must accord road materials and all other commodities requiring open-top car service their fair share of such equipment, giving preference in non-coal service to the low-capacity, open-top cars, but when such cars are not available in sufficient numbers, the higher capacity, open-top cars should be provided. This is substantially the policy required in accordance with the recent statement of the Director General to the Senate Committee. W. C. Kendall.

A copy of this message and the subsequent letter was sent by A. G. Gutheim to Mr. Sutton in Indianapolis:

> I am sending you herewith copy of a telegram which was addressed, under date of the 12th, to all Regional Directors by Mr. Kendall, and which, you will observe, very specifically takes care of the situation to which you refer. I think if you can give some publicity concerning this to the members of your organization it will assist them in dealing with individual railroads. If they still find difficulty in individual cases, and you will advise us, we will endeavor to help in these specific instances.

The substance of this article and the concluding comment have been taken from a National Sand and Gravel Producer news letter. Mr. Sutton says:

> If you are not now getting a fair supply of cars and are unable to secure prompt relief through local or division railroad officials, we suggest that you make report of the situation to the Association Office, from where it will be forwarded to the proper officials in Washington, with whom we have made arrangements for expediting the handling of all complaints in this regard.
>
> In case of acute car shortage, send preliminary information by wire and follow with full report.
>
> Give as accurate data as possible; your report will be investigated by the Car Service Section. No advantage will be gained by over-estimating your requirements.
>
> Cars are in great demand and will continue to be so until the end of the season. Load to capacity. Urge customers to unload promptly.

Concrete for Grindstones

DOWD BROTHERS, Beloit, Wis., are manufacturers of knives. Some are very large, such as are used in lumber mills and various kinds of woodworking, and these large blades require a great deal of grinding. The grindstone problem is therefore important, both from the standpoint of cost and durability. Mr. Dowd says that the types of grindstones with which we are most familiar last, in their work, from three to five weeks only, and are required in sizes ranging up to as large as 66 in. in diameter by 16-in. face.

For many years Dowd Brothers used the old-fashioned grindstones, but about five years ago R. J. Dowd conceived the idea of a concrete grindstone, and since that time has been making and using no other kind.

The concrete is cast in flat cylindrical forms and very greatly resembles the stones when dry. The sand bonded together with cement has considerable abrasive properties.

Mr. Dowd has a patent on them, but has made no effort to sell them as they were developed particularly for Dowd Brothers' own use.

This is another example of the many things that can be done with concrete.—The "Concrete Builder."

Freight Car Conditions Reviewed from Headquarters

United States Railroad Administration Statistical Report on Freight Cars and What Is Being Done to Improve Conditions

WALKER D. HINES, Director General of Railroads, makes the following statement relative to the freight car situation:

Current discussion of car shortages and related questions makes it important to bring to the attention of the public the fact that contrary to what seems to be the public assumption, conditions in this respect are substantially more favorable than they were in recent years prior to the war.

On August 1, 1917, the total car surpluses reported throughout the country were 43,481 cars, whereas on August 1, 1919, the total car surpluses were 107,900. The total number of unfilled car requisitions on August 1, 1917, was 77,257, whereas the total number of unfilled car requisitions on August 1, 1919, was only 19,271.

The number of freight cars in service and not withdrawn for repairs on July 1, 1917, was 1,983,000. The number of freight cars in service and not withdrawn for repairs on July 1, 1919, was 2,065,000.

The number of freight cars repaired and returned to service by months during the present calendar year has been as follows:

January	2,027,992
February	1,747,146
March	1,953,225
April	1,897,698
May	2,039,661
June	2,013,697
July	1,790,097

On account of the fact that the Fourth of July came on Friday this year and of the proportionately small amount of work done on the following day, the falling off in the number of cars repaired in July as compared with June is clearly explainable. The number of cars repaired per month in May and June kept fully up to the number repaired in January, although in May and June many shops were still working on shorter hours than in January.

Instructions to Regional Directors

The Railroad Administration is fully alive to the importance of the car supply situation in the United States and is handling the matter energetically.

Instructions have been issued to all the Regional Directors urging them to bend every effort to speed up road and yard movements; to secure heavier loading of equipment; to establish and maintain complete and accurate yard checks; to reduce the number of bad order cars; to make prompt delivery to connections; to effect early deliveries at freight houses and team tracks; and to expedite the movement of grain cars in terminals.

Instructions have also been issued for the establishment in each important terminal of a committee of officers of the Railroad Administration whose duty it will be to study and expedite the movement of cars, empty and loaded, in their respective terminals.

The number of cars actually in service, not including bad order cars, increased from 1,983,000 on July 1, 1917, to 2,065,000 on July 1, 1919.

Although the number of cars repaired in May and June, 1919, was fully up to the normal number of cars repaired, the Railroad Administration gave instructions on June 20, 1919, that all car forces be increased to the full standard measure of 48 hours per week and that additional shifts be worked where the additional employes could be obtained and where they could be economically used. The showing naturally to be expected from the putting into effect of these instructions was hampered in July by the intervention of practically a double holiday and, of course, was temporarily prevented in August by the strikes of a large number of shop employes. Conditions having now been restored to normal, it is expected that these instructions will promptly show a most favorable result.

The Railroad Administration instructed on August 16, 1919, that all car forces be put on a basis of 54 hours per week. It is believed that this instruction will result in a marked improvement, also in the monthly repair of a much greater number of cars than the normal number and will steadily increase the number of cars actually available for service as compared with preceding years.

In addition to this, the Railroad Administration is rapidly getting the benefit of the service of a large number of new cars constructed during federal control but whose introduction into service was postponed on account of inability to agree with the railroad corporations as to the acceptance of the cars. This inability has been overcome. Between August 1 and September 6, 23,564 of these cars have been put into service, and they are now coming into service under the spur of recent instructions at the rate of over 900 per day.

Possibilities in Slate Industry

WASHINGTON, D. C.—The Bureau of Mines of the Interior Department has recently completed an investigation of slate in this country. The slate industry, it is declared in a report just made public, has not prospered to the extent that its importance would justify in consideration of the superior nature of the material for many important uses.

The chief uses of slate are for roofing, structural, and sanitary purposes, black boards, school slates, billiard table tops, switch boards, interior parts of fire alarm boxes, tombstones, ground slate for the manufacture of surfaced asphalt shingles, and slate flour for the manufacture of linoleums, paints, and wall finishes.

With the resumption of building activity, more attention should be given to the use of slate roofing, for the material is of superior quality, and when properly placed constitutes a permanent roof. Many American slates are of excellent quality and color, the color in a number of important deposits being unfading, while the slate from some deposits actually improves in color by exposure to the weather. Some slates that do fade are preferred by architects as they fade to desirable shades.

Now that all forms of artificial roofing are so widely advertised, any natural roofing material, such as slate which may be regarded as durable as "the everlasting hills," surely justifies publicity.

While the Bureau of Mines has as yet made no detailed study of the industry, information now available would seem to indicate that the cost of production could be materially reduced and the market correspondingly widened by the introduction of more machinery and improved methods. A wider use of channeling machines in quarries, and splitting, sawing and carborundum machines in mills may be suggested. Tunneling has been employed to a very limited extent in American quarries, and an extension of this method would seem advisable, especially where valuable deposits are now covered with mountains of waste derived from previous workings. Tunneling obviates the necessity for the removal of overburden or "top," if overhead stopping is employed.

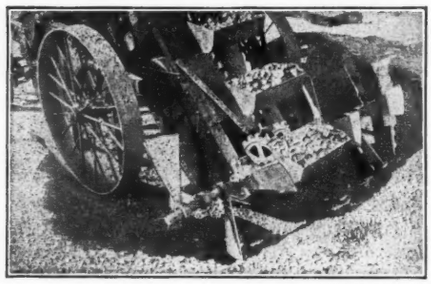
Waste is the most difficult problem in the slate industry, the percentage of waste reaching as high as 95 per cent in places. This could be reduced by, first, utilizing the slate from each individual quarry for a number of purposes rather than confining it to one use, and discarding all material that can not be thus used; second, by extending the market for by-products, and third, by the discovery of new uses for waste slate. The problem of waste is at present largely unsolved, and any solution would give a wonderful impetus to the slate industry.

NEW MACHINERY AND EQUIPMENT

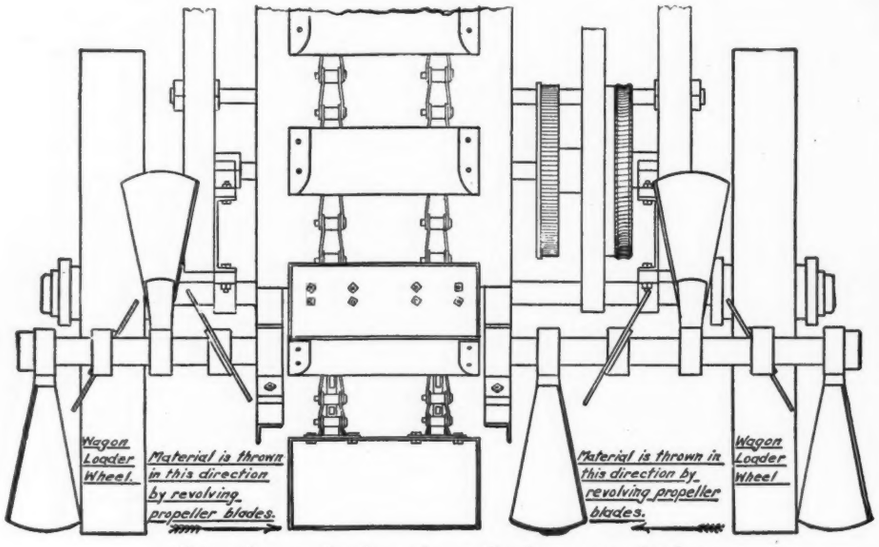
Digging Wagon Loader

A NEW LABOR-SAVING DEVICE in the way of wagon loaders is an addition to the George Haiss Mfg. Co.'s (New York City) product, known as the "Path" digging wagon loader.

This mechanism consists of a heavy steel shaft extending outward from either side of the bucket elevator, together with a number of large steel propeller blades rigidly fixed thereon. The propeller blades are set at various angles around the propeller shaft, and each blade is given a certain amount of pitch so that in revolving, the sweep line of each adjoining blade will overlap the next. It will be noted from the illustrations that the propellers on the left of the bucket elevator have an opposite pitch to those on the right. This arrangement results, when the propellers begin revolving, in propelling or pushing the materials from both sides toward the middle space where every bucket obtains a full load from the constant incoming material.



"Path" digging wagon loader



Operating mechanism of new digging wagon loader

Gasoline Locomotive Haulage Experience

ONE OF THE MOST COMPLETE gasoline-locomotive transportation systems ever installed on a construction project is that for the Miami Conservancy District in Ohio, where five big reservoirs are being made for flood prevention.

From the taking of the sand and gravel from the floor of the basin, transferring it to screening, washing and mixing plants, down to delivery of the "mix" to the forms, an exact, smooth-running system prevails, showing much careful advance thought and planning.

Sand and Gravel Plants

The method of handling the gravel and sand for this great work has been worked out with the most efficient results. The dam sites produce sand and gravel suitable for concrete construction, and large washing and screening plants have been erected at suitable points, the sand and gravel being hauled to them from the stockpile, in 12-yard dump cars.

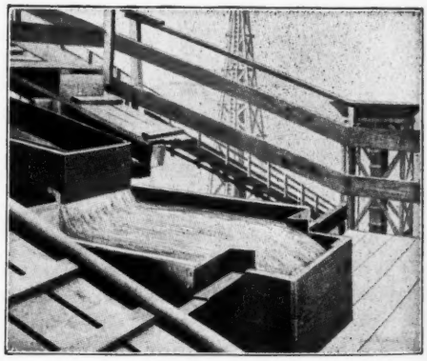
At the screening plant the gravel is dumped into a hopper from which a belt conveyor carries it up to the screens, located at the top of the plant. Here all stones larger than 3 in. in diameter are diverted into a chute which discharges into a dump car; the 1½-in. to 3-in. gravel is screened into a coarse-gravel bin; the smaller gravel goes into a fine-gravel bin, while the sand goes into a sand bin.

Chutes containing measuring boxes lead from the bins to the concrete mixer below. From the mixer the concrete is discharged into 1¼-yd. hopper cars which are drawn over a 3-ft. gauge track by a Plymouth gasoline locomotive. The tracks run alongside the work and at a slightly higher elevation, which permits pouring the concrete directly from the cars.

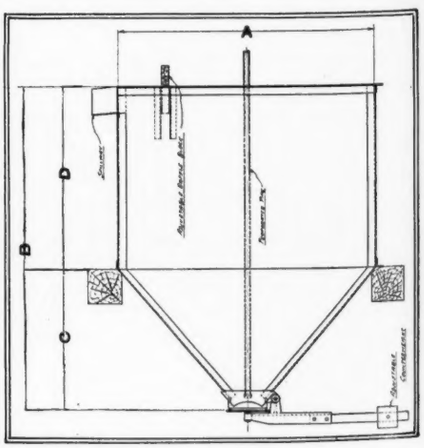
Three of these cars usually constitute a train and the amount of concrete hauled by a single locomotive and its cars has been as high as 198 cu. yds. in a single day.

Sand-Settling Tank

THE TWO ILLUSTRATIONS below are given to supplement the article in ROCK PRODUCTS of July 5, 1919, on sand-settling devices. This sand box is that made by the Smith Engineering Works, Milwaukee, Wis., and, as the illustrations show, is an automatic bottom-valve dumping device, with an adjustable baffle for controlling the overflow. Separation is assisted by use of water from the perforated pipe in the center.



Smith sand box installation



Operating parts of automatic sand box

Dumping hopper and conveyor for raw material—Typical sand and gravel plant for Miami conservancy district, Ohio

Sand and gravel plant with concrete train and construction work in foreground

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Auburn and Syracuse, N. Y.	.80	1.20	1.20	1.20	1.20	1.20
			Railroad ballast, 1.00			
Bound Brook, N. J.	1.00	2.00	1.70	1.60	1.50	.....
Buffalo, N. Y.			1.00@1.10 per ton, all sizes			
Burlington, Vt.	1.25	.....	3.00	1.75@2.00	1.75	.....
Chaumont, N. Y.	.....	1.75	1.65	1.35	1.25	1.25
Coldwater, N. Y.			Flux, 1.50@2.10			
Limekiln, Md.	.75	1.85	1.65	1.50	1.25	1.10
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00‖
Walford, Pa.	1.25	1.40	1.50	1.50	1.50	1.50
CENTRAL:						
Alden, Ia.	.40	.....	1.00	1.00	1.00	.....
Alton, Ill.	1.80	.....	1.40	1.35	.....	.....
Anna, Ill.			1.00@1.25 for prepared sizes			
Belvidere, Ill.			1.00 for any size produced			
Brillion and Sherwood, Wis.	.90@1.00	.....	1.00	1.00	.....	1.00
Buffalo, Ia.	.70	1.10	1.05	1.00	1.00	.....
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*	.....	.....
Dundas, Ont.	.65	1.05	1.05	1.05	.85	.85
Eden and Knowles, Wis.	.80@1.00	.80	1.00	1.00	1.00	1.00
Elmhurst, Ill.	.85	1.00	1.00	.85	.85	.85
Greencastle, Ind.	1.00@1.25	1.10	1.00	.90	.90	.90
Illinois, Southern	1.50	1.25	1.25	1.25	1.10	.....
Kokomo, Ind.			.90@1.00 all sizes			
Lannon, Wis.			1.00 all sizes			
Lima, Ohio	1.10	1.25	1.10	1.10	1.10	1.10
Mankato, Minn.	.....	.....	(1-in. 1.50)		(2-in. 1.25)	
Mayville, Wis.	.75	.75@ .90	1.00	1.00	1.00	1.00
McCook, Ill.	.90@1.10	1.50	.80@1.00	.70@ .85	.70@ .80	.70@ .80
Montrose, Ia.	.....	1.05@1.10	1.05@1.15	1.00@1.10	1.00	.....
Ottawa, Ont.	2.50	2.75	.....	2.25	2.00	.....
River Rouge, Mich.	.95	1.15	1.15	1.15	1.15	1.15
Sheboygan, Wis.			1.00@1.10 for all sizes			
Stone City, Ia.	.50	.....	(1-in. 1.40)	1.30	1.20	.....
Toronto, Can.	1.55	1.95	1.95	1.95	1.75	1.75
			These prices include 90c freight			
SOUTHERN:						
Brooksville, Fla.	1.00	.....	.....	2.60	.....	.....
Cartersville, Ga.	.....	1.95	.....	1.85	1.75	.....
Fort Springs, W. Va.	1.00	1.20	1.40	1.60	1.40	.....
Irvington, Ky.	.....	.....	1.00	1.00	1.00	1.00
Mascot, Tenn.	.....	1.00@1.25	.....	1.50	1.50	.....
Memphis Junction, Ky.			Average 1.10			
Winnfield, La.	1.00	1.60	1.60	1.60	1.60	1.75
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.70	1.70
			Rip-Rap, 1.30			
Blue Springs and Wymore, Neb.	.15	1.65	1.65	1.55	1.45	1.40
El Paso, Tex.			1.00 for all sizes			
Kansas City, Mo.	.60	1.40	.....	.....	.....	.....
New Braunfels, Tex.	.60	1.25@1.50	1.00@1.30	1.00@1.25	.90@1.10	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Pa.	1.25	1.80	1.70	1.60	1.50	1.25
Branford, Conn.	.80	1.50	1.50	1.20	1.10	.....
Castro Pt., Richmond, Cal.	.50*	.....	1.50*	1.50*	1.40*	.....
Duluth, Minn.	.50@.65	1.50	1.35	1.15	1.15	1.00
Farmington, Conn.	.....	1.05	1.05	1.05	.95	.....
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
Little Rock, Ark.	1.75	2.50	.....	2.00	1.50	1.35
Millington, N. J.	1.80	1.80	1.80	1.60	1.40	.....
New Britain, Conn.	.75	1.20	1.15	1.10	1.00	.....
Oakland, Calif.	.....	1.75*	1.75*	1.75*	1.75*	.....
Rock Hill, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
Winchester, Mass.	.75	.75	1.60	1.45	1.25	1.25‖

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Fair Oaks, Calif.—Cr. Bldrs.	.85	1.05	.95	.85	.85	.....
Hendlers, Pa.—Quartzite	.80	1.00	1.25	1.00	1.00	1.00‖
Little Falls, N. Y.—Syenite	.80	1.20	1.40	1.20	1.20	1.20‖
Middlebrook, Mo.—Granite	3.50	.....	1.75	1.75	.....	1.00‡
Roseburg, Ore.	.....	1.50	1.25	1.05	1.00	1.00
Redington, Pa.—Dolomite	1.00	1.10	1.10	1.10	1.10	1.10‖
Smith Siding, Richmond, Va.—Granite	1.25	.....	1.50	1.50	1.50	.....
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	.....
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20‖

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone Wholesale at Plant, per Ton

EASTERN:

Coldwater, near Rochester, N. Y.—Analysis: $CaCo_3$, 56.77%; $MgCo_3$, 41.74%—80% thru 100 mesh; ppr., 4.50; bulk	3.00
Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); ppr., 4.00; bulk	2.50
Paper bags	4.00
Cobleskill, N. Y.—Ppr., 5.00; bulk	3.00
Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk	3.25
Grove, Md.—90% thru 4 mesh; bulk	3.00
Hillsville, Pa.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 1½%—(70% thru 100 mesh) in 80 lb. ppr. bags, 4.25; bulk	2.75
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	2.25
Lime Kiln, Md.—50% thru 50 mesh; bulk	4.00
Pownal, Vt.—(50% thru 100) Analysis, $CaCo_3$, 90%; $MgCo_3$, 5%; ppr., $4.50; bulk	2.75
Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk	2.75
West Stockbridge, Mass. — Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
CENTRAL:	
Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—90% thru 100 mesh..	3.00
50% thru 50 mesh	2.00
Anna, Ill.—Ground; bulk	1.25
Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, 98.5%; $MgCo_3$, 0.5%	1.75
Belleville, Ont.—50% thru 100 mesh	2.50
Canton, O.—100% thru 10 mesh; 49% thru 100; 59% thru 50	3.00
80 lb. bags	4.80
Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh	1.00
Columbia, Ill., near East St. Louis —(¼" down)	1.25@1.80
Ellettsville, Ind.—Analysis, Carbonate, 98%	2.00
Elmhurst, Ill. — (Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$	2.00
Marble Cliff, O.—(50% thru 100 mesh) Analysis, $CaCo_3$, 86%; $MgCo_3$, 8%..	2.50
Marblehead, O. — (Analysis: $CaCo_3$, 95.33%) 50% thru 100 mesh	3.00@4.50
McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04% — 100% thru ¼" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru 100	.90@1.00
Milltown, Ind.—Analysis, $CaCo_3$, 94%; $MgCo_3$, 3%	1.50
Monon, Ind.	1.25
Montrose, Ia.—(90% thru 100 mesh)..	1.25
Mountville, Va.—Analysis, $CaCo_3$, 76.6%; $MgCo_3$, 22.8%—30% thru 100 mesh; 100% thru 20 mesh	4.00
Muskegon, Mich.—(90% thru 50 mesh) Analysis, $CaCo_3$, 53.35%; $MgCo_3$, 43.27%	2.50
Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—70% thru 100 mesh, bulk	2.50@4.00
Rockford, Ill. — Analysis, $CaCo_3$, 53.75%; $MgCo_3$, 44.35%	1.25

(Continued on next page.)

Agricultural Limestone Wholesale at Plant, per Ton

(Continued from preceding page.)

St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12% 1.50

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ⅛" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82% 1.50

Stone City, Ia.—(90% thru 50 mesh) Analysis, $CaCo_3$, 98% ..... .50

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh; 30% thru 50; 80% thru 100; 100% thru 5/32 screen) 1.80

Whitehill, Ill. — Analysis, $CaCo_3$, 96.12%; $MgCo_3$, 2.50%—
50% thru 50 mesh, bulk 1.50
90% thru 100 mesh 5.00

SOUTHERN:

Dittlinger, Tex. — Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%.
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh 2.50

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk 2.00

Irvington, Ky.—(90% thru 50 mesh).. 2.00

Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%) average price 2.00

Cartersville, Ga.—Analysis: 96 to 98% combined carbonates—All thru 10 mesh with all dust in 2.50

Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.
(80% thru 100 mesh) 2.50
(All thru 10 mesh) 2.00
80% thru 200 mesh 3.50
Paper bags $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Tyrone, Ky.—Analysis, $CaCo_3$, 93%; $MgCo_3$, 6%—90% thru 4 mesh 2.25

Winnfield, La.—(90% thru 50 mesh).... 3.00

WESTERN:

Fresno, Calif.—(Analysis, $CaCo_3$, 94%; $MgCo_3$, .02%) 50% thru 200 mesh; 90% thru 100; 100% thru 40. Prices for delivery: Sacks, 6.50; bulk Sacks, 10c each. 6.00

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 1.35

Miscellaneous Sands per Ton at Plant

Silica sand is quoted washed, dried and screened, unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. ..... 2.00@2.10
Special hand selected rock 2.50

Cedarville and South Vineland, N. J.—
Glass, damp 2.00
Glass, dry 2.50

Gray Summit, Mo. ..... 2.00@2.50

Guion, Ark—Glass on contracts 1.50

Hancock, Md.—Engine and glass ..... 2.50@3.00

Klondike and Pacific, Mo.:
Contracts 2.00
Car lots 2.50

Mapleton, Pa. 2.50
Glass, damp ..... 2.00@2.25

Massillon, Ohio 3.00

Michigan City, Ind. ..... .30@ .40

Millington, Ill. 1.75

Mineral Ridge, O. 2.75

Montoursville, Pa.—Green, washed..... 2.00@2.75

Ottawa, Ill. 2.00
Large contracts 1.75

Robinson, Md., washed, screened, not dried 2.00

Sands, Elk Co., Pa.—Selected, green.. 2.50

Thayer, W. Va.—Washed 2.75
Not washed 2.00

FOUNDRY SAND:

Albany, N. Y.—Core 1.50
Molding fine 2.00
Molding coarse 1.80
Brass molding 2.00
Sand blast 3.75

Allentown, Pa.—Core ..... 1.25@1.50

Arenzville, Ill.—Molding fine 1.50

Berkeley Springs, W. Va.—Roofing.... 2.00

Bowmanstown, Pa.—Core 1.25
Molding fine or coarse 1.50
Roofing pebble 3.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.60	.60	.60	.75	.75	.75
Boston, Mass. (On Docks)	1.25	1.00	1.75	1.70	1.60	1.60
Farmingdale, N. J.		.43	1.25	1.15	1.05	
Morristown, N. J.	.60	.60	1.20	1.00	1.00	
Philadelphia, Pa.		.95		1.40	1.25	
Pittsburgh, Pa.		.90@1.00	1.10	.90@1.00	.70@ .80	.70@ .80
Washington, D. C.—Wharves	.75	.75	2.00	1.40	1.20	1.20
West Peabody, Mass.	.35@ .45	.35@ .45	2.00	1.20	1.20	1.20
CENTRAL:						
Anson, Chippewa Co., Wis.	.50	.50	1.00	.25@1.00	.85	.85
Attica, Covington, Silverwood, Ind., Palestine, Ill.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.75	.70	1.00	.70	.70	.70
Chicago		1.25@1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Columbus, O.	1.00	.65@1.00	.60@1.00	.70@1.00	.70@1.00	.65@1.00
Des Moines, Ia.	50@1.00	.50	1.50	1.50	1.25	1.25
Earlestead, near Flint, Mich.	.55@ .60	.55@ .60		.85@ .90	.75@ .80	.75@ .80
Escanaba, Mich.		.90	1.60	1.20	1.00	.90
Fort Dodge, Ia.	1.20	1.10	1.85	1.85	1.85	1.85
Fort Jefferson and Mechanicsburg, O.	.50	.50	.50	.70	.60	.60
Grand Rapids, Mich.		.65*		1.15*	1.00*	1.00*
Grass, Mich		.90	1.60	1.20	1.00	.90
Illinois, Northern	.50@ .60	.60@ .70	.75	.60@ .75	.60@ .75	.60@ .70
Indianapolis, Ind.		.60			.75	
Janesville, Wis.		.50			.60@ .70	
Mason City, Ia.	.70	.60	1.55	1.50	1.40	1.35
Milwaukee, Wis.			1.20 for all sizes			
Minneapolis, Minn.	.50	.50	1.75	1.50	1.35	1.35
Moline, Ill.	.60	.60@ .80	1.00@1.20	1.00@1.10	1.00	1.00
Montezuma, Covington, Ind.	.75	.75	.85	.75	.75	.75
Oxford, Mich.		.55	.90	.90	.80	.80
Rockford, Ill.		.60			.60	
St. Louis, Mo.	(Mississippi sand, 1.90; Meramec river sand, 1.95)					
St. Louis, Mo., F. O. B. cars	1.35	1.20	1.50	1.30		1.25
Summit Grove, Ind.	.75	.75		.75	.75	
Terre Haute, Ind.	.75	.75	.85	.75	.75	.75
Waupaca, Wis.		.35				.70
Winona, Minn.		.70	1.60	1.10	1.10	1.10
SOUTHERN:						
Knoxville, Tenn.	.85	.85	1.50	1.50	1.50	1.20
Lake Weir, Fla.	.50					
Macon, Ga.		.75				
Memphis, Tenn.	.80	.80			1.00	
New Martinsville, W. Va.	1.30	1.00@1.10		1.20		.70@ .80
Pelzer, S. C.	.65					
Roseland, La., and Condron, Miss.		.40	1.00	1.00	1.00	1.00
Thomas, La.	.60					1.75
Waco, Texas	.70@ .80	.70@ .75	1.10			1.10
WESTERN:						
Kansas City, Mo.	.60	.60	(Kaw river sand retail 1.50 per cu. yd.)			
Lincoln, Neb. (on cars)	1.00	1.00	2.10	2.10		1.90
Niles, Calif.		.50@ .75	.50@ .75	.50@ .75	.50@ .75	.50@ .75
Pueblo, Col.	.80*	.60*			1.50*	
Roseburg, Ore.	1.50	1.00	1.25	1.00	1.00	1.00
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
San Francisco, Calif.	1.00@1.25	1.15	1.20	1.20	1.20	1.20
Seattle, Wash.	1.25*	1.25*	2.00*	1.25*	1.25*	1.25*
Yorkville, Ore.	.60	.60@ .75	.70	.60@ .75	.60	.50@ .60

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Burnside, Conn.	.80*					
Lowell Junction, Mass.	.75*	.65*@.75*	.60*			
Pittsford, N. Y.		.50@ .55			.50@ .60	
Yardville, N. J.		.50@ .75				
York, Pa.		1.00@1.10	(crushed rock sand)			
CENTRAL:						
Attica, Covington, Silverwood, Ind., Palestine, Ill.	.60	.60	.60	.60	.60	.60
Des Moines, Ia.	Washed concrete mix., 25% gravel, .70; 50% gravel, .90					
Escanaba, Mich.			1.00 cu. yd., all sizes			
Gr'd Rapids, Muskegon, Mich.		.30				.40@ .50
Grass, Mich.			1.00* (all sizes)			
Hersey, Mich.	.50			.50	.50	.50
Illinois, Northern						.50@ .60
Indianapolis, Ind.			Washed concrete, mix, .65			
Janesville, Wis.					.55	
Montezuma, Terre Haute, Ind.					.60	.60
Oxford, Mich.					.85	
Rockford, Ill.		Sand and Gravel mixed, .55@.65				
Saginaw, Mich. (Incldg. frt.)	1.05	1.05	1.20	1.20	1.20	1.20
Summit Grove, Ind.			.50 for all sizes			
Wabash Valley District, Ind.			.60 for all sizes			
Waupaca, Wis.						.40
Winona, Minn.			Pit run gravel under 2-in., .70			
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dudley, Ky. (Crushed Sand)		.95		1.00		
Lindsay, Texas	1.25				.50	
Thomas, La.						.65@ .85
Waco, Texas						.67
WESTERN:						
Pueblo, Colo.	.60*		River Run, .60 unscreened			
San Francisco, Calif.			.25 on cars at plant			
Saratoga, Jan Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ore.		.40			.40	

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag Wholesale at Plant Per Ton

City or shipping point	Roofing	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Buffalo	2.00	.85	.85	.85	.85	.85	.85
E. Canaan, Conn.	4.00	1.00	1.50	1.15	1.00	1.00	1.00
Erie, Pa.	1.75	.85@1.00	1.00@1.50		1.00	1.00	1.00
Emporium, Pa.		1.00	1.00		1.00	1.00	1.00
Ensley, Ala.	2.05	.90		.90@1.20	1.00	.90	.85
Hokendaugua and Topton, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Lebanon (Donaghmore), Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	.75	1.50	.85	.85	.85	.85
Pittsburgh, Pa. (East)	2.05	1.10	1.50	1.10	1.10	1.10	1.10
Pittsburgh, Pa. (West)	2.25	.75	1.50	.85	.85	.85	.85
Sharpsville, Pa.	1.75	1.00	1.25	1.00	1.00	1.00	1.00
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton and Jackson, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Toledo, O.	All sizes, 2.00, F. O. B. Toledo						
Youngstown, Dover, Hubbard, Leetonia	2.00	1.10	1.50	1.10	1.10	1.10	1.10

Agricultural Lime and Hydrate at Plant Per Ton

	— Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Berkeley, R. I.		16.00	45	15	
Bellefonte, Pa.	7.25		95.5	.72 to .89	
Bridgeport, Pa.	7.50		55	44	10.25
Cavendish, Vt.		2.50 bbl. in car lots			
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Lycoming Co., Pa.	5.00@5.50		78.67	1.33	
East Sparta, O.					9.00
Espy, Pa.	4.50		82	1.25	
Farnams, Mass.	5.00	7.50			
Frederick, Md.	8.00				10.50
Grove City, Pa.	7.00 lmp.	9.00 grd.	75.48	0.80	10.00
Grove, Md.	8.00				10.75
Highgate Springs, Vt.		8.00	85	2	
Hollidaysburg, Pa.	6.50		94.25	.30	
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Bluff, Pa.	5.00@6.25		78.67	1.33	
Lime Ridge, Pa.	5.00@6.25		80.56 to 62.56	3.87 to 1.75	
Mt. Union, Pa.	4.13		96.6		
Munns and Blakeslee, N. Y.	3.00	4.50	53.0		
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Ottawa, Ont.	12.00		95	1.5	
Paxtang, Pa.	5.00		60	12	
Rasindale, N. Y.	8.00		96	5	
Steuben, Pa., Dover Plains, N. Y., York, Pa.		7.00@9.50	70		10.75 to 12.00
Union Bridge, Md.	8.50		73	1	10.75
West Rutland, Vt.	5.00	7.50	68	3	10.00
Williamsport, Pa.	5.00@5.50		80 to 90	2 to 3	
Williams Station, Pa.	7.50		60.6	39.1	9.75@10.50
Zylontte Station, Adams, Mass.		8.00			
CENTRAL:					
Alton, Ill.	9.50				
Canton, O.		9.00			9.00
Delaware, O.			50	5 to 12	8.50
Forest, O.	7.50				
Manistique, Mich.		10.00	54 & 95	40 & 1.75	10.00
Marblehead, O.	2.25	3.75			8.75
Mitchell, Ind.	9.00				11.00
Springfield, O.			33.62	17.73	9.00
Woodville, Ohio			46 to 48	30 to 34	8.00
SOUTHERN:					
Burns, Tenn.	8.00		95.6	0.54	11.00
Chippewa, Fla.	5.00		80.0	15.0	
Erin, Tenn.	8.00		99		
Hopkinsville, Ky.	3.00	6.50	98.75		
Hot Springs, N. C.	2.70	4.20			
Knoxville, Tenn.	2.00		57	3	
Lineton, Va.	8.50		97	1.74	
Louis Brook, Va.	8.00	10.25	90	1	
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	4.50		82	1.75	
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	6.50	9.00	93	5.5	
WESTERN:					
Bellins, Wash.					12.00
Colton, Calif.	4.50		95 to 97	1.5 to 3.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Kirtland, N. M.	10.00				
Knowles, Wis.	8.00	9.50	55	45	9.50
Lime, Ore.	15.00		91.48	0.58	
Oscas Island, Wash.		5.50			16.50
San Francisco, Calif.					15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands per Ton at Plant

(Continued from preceding page)

Cedarville and So. Vineland, N. J.—	
Core, damp	2.00
Core, dry	2.50
Cleveland, O.—Core	1.25@1.50
Molding fine, molding coarse	1.75@2.25
Brass molding	1.25@2.00
Delaware, N. J.—Molding	1.50@2.00
Dundee, Ohio—Molding, steel	1.75
Eau Claire, Wis.—Core	2.25
Roofing sand	3.00
Brass molding and sand blast	2.25
Fleetwood, Pa.—Furnace lining	2.15
Refractory silica	2.15
Franklin, Pa.—Core, traction and brass molding	2.00
Molding, fine	2.00
Molding, coarse	1.50@1.75
Gray Summit, Klondike and Pacific, Mo.—Molding fine	1.50@2.00
Greenville, Ill.—Molding coarse red	1.60
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.85
Leesburg, Pa.—Core, furnace lining, molding fine and coarse,	2.00
Mapleton, Pa.—Molding, fine and core, damp	2.00@2.50
Molding, fine, dry	3.00
Massillon, O.—Steel molding coarse	2.50
Furnace lining	3.00
Core	2.50
Michigan City, Ind.—Core, bank	.30@ .40
Millington, Ill.—Furnace lining, roofing, stone sawing	1.75
Core	1.50
Mineral Ridge, O.—Core, molding, sand blast, roofing, brass molding, etc., washed, screened (damp)	2.10
Montoursville, Pa.—Core, molding fine, traction, brass molding	1.25@2.00
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Ottawa, Ill.—Sand blast	3.50
Core, furnace, steel molding	2.00
Roofing sand	2.00@3.50
Stone sawing	1.50@2.00
Providence, R. I.—Core	2.00
Molding fine	2.00
Molding coarse	1.80
Brass molding	2.00
Sand blast	3.50@4.00
Sugar Grove, Ohio—Core (dried and screened)	2.00
Traction	2.00
Thayers, Pa.—Core and traction	2.00
Traction	1.75
Roofing, not washed	2.00
Furnace lining	1.25
Utica, Pa.—Core	2.00
Molding coarse, steel	2.00
Traction	2.00
Brass molding	2.00
Warwick, O.—Core	2.00
Furnace lining, green	2.00
Molding, fine	2.00
Molding, dried and screened	2.25
Green	2.00
Wedron, Ill.—Molding	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, O.—Molding fine	1.50
Traction	.75
Molding coarse	1.25
Brass molding	1.75

Ground Gypsum Rock, per Ton, at Plant

Castalia, O.—Raw, to cement mills	3.50
Crushed, not ground	3.00
Land plaster	6.00
Fort Dodge, Ia., bulk	3.50
Garhutt, N. Y.—Land plaster, bags	7.00
Grand Rapids, Mich.—Crushed gypsum	3.00
Ground gypsum rock	7.00
Gypsumville, Man., Can.	3.00
Oakfield, N. Y.	7.00
Sandusky, O.	6.00

Jute sacks, $3.00 extra; paper, $1.00 extra.

Ground Rock Phosphate at Plant, per Ton

Centreville and Gordonsburg, Tenn.—B. P. L., 60% to 70%; ton, 2240 lbs. Ground rock phosphate (90% thru 100 mesh)	6.00@8.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centreville, Tenn.—B. P. L., 60%	7.00
B. P. L., 70%	7.75@8.00
B. P. L., 78%	8.00
Mt. Pleasant, Tenn—(B. P. L., 70%)	
12%	6.00
13%	7.00
14%	8.00
Mt. Pleasant, Tenn.—B. P. L., 60% to 70%	6.00@8.00
Nichols, Fla.—Pebble, B. P. L., 70%	10.00
Wales, Tenn.—B. P. L., 70%	7.50@8.50
Walls, Tenn.—B. P. L., 70.2%—	
To County Agri. Assns.	7.50
To others	7.75

Florida Soft Phosphate

Jacksonville (Fla.) District (Add 2.50 for sacks)	10.00@12.00
Phoslime, Fla. (in burlap bags, 100-200 lbs.)	14.00@17.50
Benotis, Fla.	9.00@11.00

General News From the Rock Products Markets

Business Conditions in the Central West Best in Five Years

TOTAL CONTRACTS awarded during the eight months of 1919 in the Central West, comprising Illinois, Indiana, Iowa, Wisconsin, Michigan and portions of Missouri and eastern Kansas, amounted to $582,627,000, an increase of 61 per cent over the average figure for similar periods of the five years previous, according to statistics compiled by the F. W. Dodge Company. The figures all are expressed in 1919 construction costs.

The peak in this district was passed in June. The August total was $84,636,000, 39 per cent less than the total for June of this year, and 12 per cent less than the total for July. However, the August figure indicates activity 55 per cent greater than the average for the same month during the five years previous.

Although the entire region shows a decline from the figures of both June and July, figures compiled by J. C. Hays, clerk to the commissioner of building of Indianapolis, according to the Indianapolis News, indicate that Indianapolis has gained instead of lost. While the figures received at the city office show the amount of the building permits, which almost always are lower than the final cost of the buildings—and, no doubt, some of the work for which permits were taken out was contracted for during July—yet the increase is so great that indications are that more work was contracted for during August than July.

Increase of Concrete Road Building

THE FIGURES from September Concrete, giving the volume of concrete highway construction in the United States and Canada for the last decade, show the development of this type of road. Before 1909 it was practically in its experimental stage. In that year actual construction started, until it reached a maximum in 1917.

	Sq. Yd.
Prior to 1909	799,390
Laid in	
1909	561,271
1910	1,313,499
1911	2,069,445
1912	5,295,447
1913	9,596,286
1914	14,815,034
1915	16,936,137
1916	24,218,955
1917	25,000,000
1918	17,000,000
Total	117,605,464

Concrete road construction in both countries was checked to some extent during 1918 by the world war, but during the present year everything points to the completion of a very large program.

Don't Let the Railways Sting You for Side-Track Maintenance

BEN STONE, business manager of the Illinois and Chicago Association of Sand and Gravel Producers, reports:

"One member mentioned in a casual way during the present week that he had just received a bill of considerable size from the railroad serving his plant, for maintenance work on side tracks, although the tracks at his plant are located on ground leased from the railroad company. Terms of lease do not require him to pay cost of track maintenance. The bill rendered referred to General Order No. 15, United States Railroad Administration. Such bills should be returned to the carrier and attention called to Supplement No. 2 of General Order No. 15, which was issued as of August 9, and which provides that operation and use of tracks constructed prior to March 26, 1918, shall be continued under the same conditions as obtained prior to that date. In other words, the Administration has given up its efforts to have all side tracks covered by written contracts and has ordered that the customs under which tracks were used prior to March 26, 1918, shall be considered equivalent to a written contract and shall be observed accordingly."

Ohio Quarries Make Deliveries of Agricultural Limestone by Motor Truck

AT LEAST FOUR Ohio quarries are delivering agricultural ground limestone by motor truck, according to local newspaper accounts.

A charge of 75 cents a ton for the first three miles; $1, up to five miles; and 17 to 18 cents per ton mile beyond that distance is made by one company. Charges of from 10 to 15 cents a ton mile are made by other firms.

These concerns find that farmers prefer such delivery service rather than hauling limestone themselves, and also that it has stimulated a big increase in the stone business. On account of the somewhat broken and hilly country surrounding Bellefontaine, one stone company operating such a service there, attributes its success to the use of a four-wheel drive truck. With this outfit four tons of stone is delivered under almost any condition met.

Experience of concerns at Columbus, Lima, and Piqua would seem to indicate that ground limestone can be delivered by truck, where roads are good, at lower cost than farmers can haul it themselves.

International Trade Conference at Atlantic City

THE INTERNATIONAL TRADE CONFERENCE is to be held at Atlantic City on September 30 to October 3, by invitation of the Chamber of Commerce of the United States.

Committees have been working diligently in the United States and Europe with the view of making a program which will afford opportunity to bring before the International Trade Conference the big subjects requiring attention. An exceptional program, accordingly, has been arranged. All the countries have a common interest in most of the topics.

Under the heading of major topics is scheduled economic readjustment of commercial and industrial conditions in England, France, Italy and Belgium. It is deemed essential that a frank statement be made as to what is needed to place these countries on a basis of stable and enlarged production. This, it is pointed out, perhaps, would involve something like an inventory of available supplies and resources, with the view of arriving at an estimate as to the requirements of food, raw material and manufactured articles for, say, a two-year period, and should be of a character to serve as a guide to American business men, manufacturers, producers, bankers, etc., in planning their trade relations in the future.

Such subjects as finance, international fair play, and food and cost of living will also be up for discussion.

Cement Industry Unaffected

CEMENT is finding a ready market these days, in spite of State and Federal government suits. This is evidenced by the news that several cement plants are increasing their capacity to take care of this demand. Practically all sections, according to available information, are reporting large shipments.

Our Foreign Labor Problem

VARIOUS CONGRESSMEN are now gathering material to use in the fight which will come sooner or later on the restriction of immigration into the United States.

It is pointed out by the Associated General Contractors that while other matters have been occupying the attention of Congress recently, it must not be forgotten that determined efforts will be made to cut off entirely the supply of labor normally obtainable from incoming foreigners.

General News From the Rock Products Markets

The United States Bureau of Standards Devoting Attention to Cement

WASHINGTON, D. C.—Reports just secured from the Bureau of Standards by the Washington Bureau of ROCK PRODUCTS show that the laboratories at the bureau are devoting considerable attention to cement and concrete. The end of the war and the resumption of building, together with the wider use now made of cement in construction, make these investigations most timely and of interest not only to the industry but to the public at large.

Tests have been continued on methods of measuring the workability quality of concrete as distinguished from flowability. Tests have been made in which the weight of a tamped cylinder (100 per cent workmanship) is compared with a cylinder filled by dribbling or allowing the concrete to flow in the measure with zero per cent work. The dribble specimens, having nearly the weight of the tamped ones, have been found to be the more workable mixture.

In the case of rich concretes and those with lime, the differences between the tamped and dribble weights were found to be less than for lean concretes and those without lime.

A new method of measuring plasticity, in which a circular pat of concrete is placed on a revolving disk and rotated at different speeds, has been tried out by the bureau's experts. Preliminary results are promising, it is reported, but additional work will be necessary before a statement can be made as to the value of this method.

Measurements of the time of set of concrete have also been made by a new method, which consists of molding several disks of concrete and placing them in a damp closet and obtaining their flowability at given intervals until about three or four hours after mixing. Indications are that the flowability decreases with time and the point at which the concrete ceases to flow and becomes crumbly can be considered its initial set. Tests have been made on neat cement with similar results, except that the point of non-flow was reached in a somewhat longer time.

Comparative tests were made during the past few weeks on two cements submitted by a manufacturer, one of which was of normal fineness, the other being an especially fine cement. Results of two-day tests indicate that concrete made of the fine cement is about 100 per cent stronger in the three mixes tried than the concrete made of normal cement.

Ben Stone on Standardization of Sand and Gravel

WE ARE INFORMED that Prof. T. R. Agg is chairman of a Committee appointed by the Mississippi Valley Association of Highway Officials to devise standard specifications for concrete aggregates to be used in highway construction.

The real problem with which highway engineers are confronted is the construction of a road that will hold up under the constantly increasing heavy truck traffic. Some seven states in the Mississippi Valley are now using a gradation of aggregates similar to the Illinois specifications. There is a probability that the engineers will recommend a larger sizing of the coarse aggregate to be used in concrete roads. Sand and gravel producers are quite naturally deeply interested in the study and tests being made by highway engineers, and as a result considerable thought has been given to standardization.

As we understand it, standardization in industry means the elimination of useless varieties of styles or forms. Applied to the sand and gravel industry it means gradation of materials produced in a given locality so as to meet the actual requirements of the immediate markets. In Illinois the production of sand and gravel is standardized in respect of conditions obtaining in given districts, and it is reasonable, we think, to assume that the same is true elsewhere.

It would seem, therefore, that the real problem before the highway engineers can not be solved by an attempt at universal standardization of sizes, but the remedy must be had through an adjustment of freight rates and the adoption of specifications that will make the materials actually produced available for use in road construction.—Ben Stone, Business Manager, in Weekly Letter of Illinois Sand and Gravel Producers Association.

Construction Work in Texas Oil Fields

IN ORDER to provide ample water supply for carrying on oil development operations in the oil fields of Central Texas, a number of the larger companies have created vast reservoirs for collection of water. Most of the construction is of concrete

Some of the largest projects are a 30,000,000 gal. and a 10,432,000 gal. reservoir by the Gulf Production Co., and a 2,608,000 gal, and a 3,586,000 gal. reservoir for the Sinclair Gulf Pipe Line Co.

Chicago Building Tie-up Ended

AFTER HAVING been unofficially anticipated several times, the end of the Chicago building tie-up has been reached. Several weeks ago an agreement was reached between delegates and put up to a vote of the carpenters, but was rejected.

The final settlement results in every one of the Building Trades receiving $1 per hour. The carpenters were first to win out, but only one day later the cement finishers, lathers, ornamental iron setters and glaziers, who were getting 80 cents per hour and had been increased to 92½ cents, were given the dollar an hour.

The agreement is to hold until May 31, 1921, except that it may be opened on the wage scale only, on or before May 1, 1920. The terms sound rather temporary, but will afford immediate relief, anyway.

Monday morning, September 22, Chicago papers were filled with want ads for carpenters and building men. The ten weeks' inactivity being ended, every man was needed. William Brim, chief of the carpenters, said he received calls all day long for men.

Now that the building trade men are back at work, the steel strike situation faces Chicago. The Illinois district seems to be more completely tied up as to steel plant operation than any other section. It is believed, however, that this situation can not greatly affect Chicago for at least a month to come.

August Building Report

BUILDING permits issued in 153 cities of the United States during the month of August, as officially reported to The American Contractor, show that building activity has forged ahead as evidenced by number and valuation of permits taken out.

It is interesting to note that the valuation of the individual permit has increased considerably, the average value in August being $4,534 as against an average value of $3,760 for July.

Activity may be said to be spotty, but there are no defined regions wherein cities show gains and where they show losses.

Important cities wherein relatively heavy gains are shown are Akron, Boston, Cleveland, Des Moines, Duluth, Fort Worth, Grand Rapids, Mich., Indianapolis, Pittsburgh, Pueblo, Seattle, Toledo, and Worcester, Mass.

Chicago, Denver, Philadelphia, South Bend, Ind., Springfield, Ill., Tulsa, Okla., and Wilkes-Barre, Pa., show great recession from July valuations.

Passed By The Screens

Incorporations

Traill Sand and Gravel Co., Grand Islands. Neb., incorporated with a capital of $65,000.

The Crescent Gravel Co., Wilmington, N. Y., has been organized with a capital of $75,000. They will also deal in brick and cement.

The Daleville Lime Marl Co., Daleville, Va., has been organized with a capital of $50,000. The lime plant to be erected will have a daily capacity of 60 tons.

The Herscher Phosphate and Limestone Co., Herscher, Ill., has been organized with a capital of $5,000. Incorporators are Roy G. Wilco, N. A. Olsen and George Grob.

The Wilmington Crushed Stone Co., Wilmington, Ohio, has been organized with the following officers: J. M. Sprague, president; C. W. Fisher, secretary; A. J. Wilson, treasurer. The plant will be at Melvin, but the main offices will be located in Wilmington.

The Cass City Sand and Gravel Co., Cass City, Mich., has been organized with a capital of $100,000, and has purchased land 1½ miles south of that city on the Grand Trunk Railroad. Incorporators are A. Frutchey, Joseph Frutchey, J. A. Caldwell and Ernest Schwaderer.

The Lone Star Stone Co., Wichita Falls, Texas, has been incorporated with a capital of $100,000, to develop and operate a stone quarry near Chico. The product will be used for road construction. J. A. Kemp is president and G. D. Anderson is secretary-treasurer and general manager.

The Reliance Gravel and Sand Co., Des Moines, Ia., has been incorporated with $50,000 stock. It will quarry and mine sand, gravel, marble and stone, and will do a general construction business. The incorporators are: M. H. Cohen, president; William Brecht, vice president; George Van Dyke, secretary, and W. B. Roberts, treasurer, all of Des Moines.

The Fisher Lime and Cement Co., Little Rock, Ia., has been reorganized as the Fisher Cement and Roofing Co. W. W. Fisher, president; F. R. Thomas, vice president; C. R. Brown, secretary; J. M. Wood, treasurer. Mr. Brown has been managing the Little Rock business and will now have charge of the roofing, pipe insulation, cold storage work, etc. Mr. Wood was formerly with the General Fire Proofing Co.

Potash

Shipments of 10,000 tons of potash from Germany to United States, said to be the first since 1914, has been contracted for and ships for transportation provided by the Shipping Board.

The Herbert Hord Potash Plant, Lakeside City, Nebr., burned, with a resulting loss of $500,000. Spontaneous combustion of coal caused the fire. It is not known for certain whether the plant will be rebuilt or not.

Sand and Gravel

The Oliver King Sand Co., Knoxville, Tenn., is having a floating dredge built at the South Knoxville boat yards.

The Iron City Sand Co., Pittsburgh, Pa., through the aid of their three sand boats are able to bring to Pittsburgh about 10,000 tons of sand per day. At present all of this is being used as fast as it can be delivered.

The Iowa-Nebraska Sand Co., recently organized at Nebraska City, Nebraska, will have a new dredge in a few days and will begin pumping sand from the river. The company has purchased land and will be located at the foot of Central Ave.

The Ball-Benton Gravel Co., Little Rock, Ark., of which J. J. Ball is president, has filed an amendment to the articles of agreement and incorporation of the company, increasing the capital stock to $50,000 and abolishing the clause providing for preferred stock.

The Marlborough Sand and Gravel Co., formerly the J. B. Rose Co., has recently been purchased and reorganized by interests connected with the Alsens American Portland Cement Co., New York, N. Y. At a meeting held recently in New York City, the officials and directors of the new company were elected. M. H. Reiss, James W. Kittrell, and Harold R. Every, were big factors in the organization, which has a present valuation of $500,000. The property covers 200 acres, and is provided with up-to-date methods of handling and shipping its product.

The Daigler Sand and Gravel Co., Williamsville, N. Y., has assumed control of the Adam Daigler property, with S. J. Russell in charge. The incorporators of the new company are as follows: S. J. Russell of Rose Acres, Williamsville, president and general manager; Frank G. Bishop of Eggertsville, vice-president and treasurer; Edward R. Haist of Buffalo, secretary; George W. Notley of Buffalo, master mechanic. The installing of new machinery has been begun and it is expected by spring that the pit will be equipped to supply gravel and sand with all modern appliances.

The Keystone Sand and Supply Co., Pittsburgh, Pa., is operatig both of its dredges at full capacity and is producing 6,000 tons of sand and gravel per day. A portion of this material is being stored for shipment during the winter months. Four loading docks are now being operated, which enables the company to make rush shipments on scheduled time. The loading docks are located at Neville Island, Groveton, North Side and McKeesport. Deliveries are now being made with a fleet of new high decked steel barges to all points on the local rivers, effecting a material saving in freight to customers. On or about October 1, the Keystone company will add four new barges, with a capacity of 2,700 tons to its fleet. This will make its fleet capacity 11,500 tons. Downtown offices of the Keystone Sand and Supply Company are located in the Diamond Bank Building.

Retail Dealers

The J. C. McNabb & Son Co., Winnipeg, has been incorporated with a capital of $100,000 to manufacture and deal in gypsum, plaster, brick and building material.

The Follett Co., Coloma, Wis., has been incorporated with a capital of $50,000, to deal in cement and all kinds of building material. The incorporators are Vilas Follett, S. C. Runnels and W. T. Gray.

Manufacturers

The Worthington Pump & Machinery Co., New York, N. Y., announces the purchase of the plant and equipment of the Epping-Carpenter Pump Co., Pittsburgh, Pa. All orders and business on hand will be completed by the Worthington Pump & Machinery Co., and all correspondence should be addressed to the new office at No. 10, 43rd St., Pittsburgh, Pa.

The Allis-Chalmers Manufacturing Co., Milwaukee, Wis., is circulating an 18-page booklet, Bulletin No. 1456, which is devoted to the presentation of the Fairmount type crusher. These are produced in sizes from 24x60 in. to 60x84 in. The bulletin features these crushers as especially favorable to a large receiving opening, with forcible mechanical discharge, and a roll crushing action such as to reduce the percentage of fines. The machine is well illustrated and described.

Quarries

The Branchville Co-operative Limestone Co., Newton, N. J., has erected buildings and is installing a crusher plant to produce agricultural limestone. The company will be ready for production within a week.

A valuable deposit of limestone suited for cement manufacturing has been found on an 800-acre tract of land owned by the city of Colorado Springs, Wis., and may be leased for that purpose.

Utah Lime & Stone Co., Salt Lake City, Utah, requests reduction in present rates on lime, carloads, from Dolomite, Utah, to points on Union Pacific Railroad east of Ogden and west of Colorado common points, also to have 50,000 pounds minimum published in lieu of 60,000 pounds minimum to Oregon Short Line Railroad points. The request is to be considered by the Salt Lake district freight traffic committee at an early date.

Personals

Walter J. Flanagan, who has been manager for the Standard Lime and Stone Co., at Strasburg, Va., for the past nine years, has taken charge of the plant of the Washington Building Lime Co., at Bakerton, succeeding D. R. Houser. Mr. Houser's health has not been good for some time and he will take a vacation.

USED EQUIPMENT

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

STONE CRUSHERS

Need one, large or small? We are headquarters for good "used" machinery of this character. At present our holdings consist of nearly 100 different sizes—Gyratory Crushers from No. 2 to No. 21, Jaw Type from 8x14" to 60x84", also several Symons Disc and Crushing Rolls.

Let us know your requirements and you will hear from us by return mail. Inquiries also solicited for:

Locomotive Cranes, Steam Shovels, Locomotives, Cars, Rails, Hoists, Cableways, Compressors, Etc.

Wm. B. Grimshaw Co., 1048 Drexel Bldg., Phila., Pa.

Dealers in USED but NOT ABUSED Machinery

Immediate Shipment

20—Crushers, 2 to 10, mostly Gates.
40—Air Comp's, 80' to 4000'.
5—Rock Crushing Plants, 200 ton-2500 ton.
40—Steam Engines, 100-1000 H. P.
5—150 H. P. 125 lb. H. R. T. Boilers. $8.50 H. P. Butt strap.
1—150 H. P. Heine W. T. Boiler, 175 lb. Prac. new. $14.00 H. P.
1—No. 10 Gates Mang. Fit. $6500.00.
1—100 H. P. 440 V. 60 Cy. 3 Ph. Motor. New.
1—312 Kva. 240-480 V. 60 Cy. 3 Ph. Non-Cond. Allis Steam Turbo.

Send us your inquiries.

ROSS POWER EQUIPMENT CO.
Indianapolis, Ind.

FOR SALE OR EXCHANGE

2—17x24 "Brooks" 4-4-0 American Passenger Locomotives.
1—No. 7½ Austin Crusher.
1—Class G-2 Ingersoll Rand Duplex Steam Driven Compound Air Compressor, 14x22¼x14¼x18. Capacity, 925 cubic feet of air per minute.
1—7-ton Superior Iron Works Stone Grapple.
1—Lot of Repairs for No. 6 Austin Crusher.

Send for List

The Casparis Stone Co.
Clinton Bldg., Columbus, Ohio

FOR SALE—CHEAP

7½ Austin Elevator, friction drum hoist, 30" gauge end dump quarry cars, miscellaneous 6" to 14" new and second hand belting, pulleys, screens, etc.

Prices on Application.

THE FRED R. JONES CO.
139 No. Clark St. Chicago

FOR SALE

1 Belt Conveyor with 18"—6-ply belt, rollers and end pulleys.

Bettendorf Stone Co.
Bettendorf, Iowa

FOR SALE

24-ton American 36" gauge saddletank Dinkie.
Monighan Dragline, 70' boom, 2½-yd. bucket.
Lidgerwood Dragline, 50' boom, 1-yd. bucket.
2 Revolving Driers, 20'x4' and 35'x5'.
2 No. 7 Gates Ball Mills.
3 Williams Pulverizers.
40-ton Thew Shovel Railway Trucks.
10x12 Mundy DC DD Hoist.
Jaw Crushers, 9x15, 10x20, 12x24.
Gates Gyratory Crushers, Nos. 5, 6 and 8.
1924' capacity Norwalk Air Compressor.

Donahue & Company
20 West Jackson St., Chicago

FOR SALE

BUCYRUS 40-R — Yard and half dipper, standard gauge type, shop number 2254. Boiler perfect. Shovel in A-1 condition.

RACINE STONE COMPANY
134 So. LaSalle Street Chicago, Illinois

PRIVATE EQUIPMENT

Bucyrus Shovel, 65 ton, 2½ yd., on railroad trucks.
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